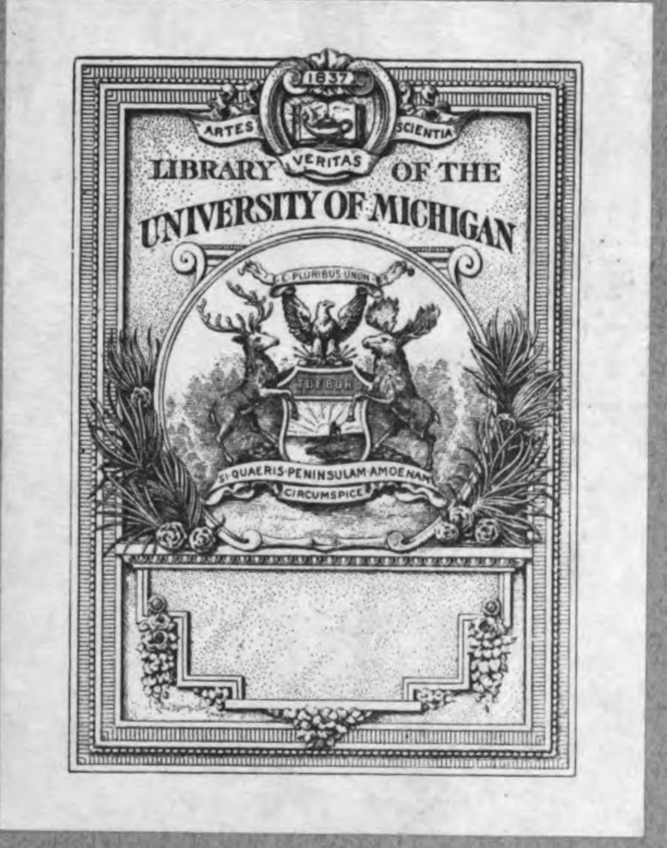
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VOL. 7 NO. 1

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PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

UNDER THE SUPERVISION OF

SURGEON GENERAL C. F. STOKES

U. S. NAVY

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TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

C. F. Stokes,
Surgeon General, United States Navy.

U. S. NAVAL MEDICAL BULLETIN.

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SPECIAL ARTICLES.

ROTCH METHOD OF ROENTGENOGRAPHIC AGE DETERMINATION.[1]

By HAROLD W. SMITH, Passed Assistant Surgeon, United States Navy.

OUTLINE OF REPORT.

I. DESIRABILITY OF AN ANATOMICAL METHOD OF AGE DETERMINATION.

The whole subject of anatomic age determination and its value has been discussed at length by Dr. Rotch[1] in several papers, but some of the reasons why such a system as he proposes is desirable may be briefly summarized here.

Anyone whose attention has been called to the records of physical examinations at institutions where such records are kept will be impressed by two facts: First, the great variation in size and strength

[1] Based upon a report submitted to the Secretary of the Navy in October, 1910, relative to the advisability of adopting this method at the United States Naval Academy. Owing to expense and lack of space, the only photographs and charts which have been reproduced are certain typical ones essential to an understanding of the methods pursued in the study.

among youths of the same age, and, second, the number of physical defects that develop among the students without recognized cause. Some of the lesions can be attributed in a general way to athletics,[2] but for the most part, since they appear largely among individuals defective in physique, they are assumed to be manifestations of poor or retarded development.

What is there that is characteristic of these men possessing inferior physical development that should cause them to suffer from specific ailments of various sorts? This question has been tentatively answered in part by the observation that these defectives are men in whom the process of maturing is delayed so that their stage of bodily development does not correspond to that normal for their years; that is, they are relatively immature.

Since the work of each class in any school is of such character and amount as has been found by experience to be judicious for the majority of students of that grade, it is obvious that an individual that is relatively immature will be at a disadvantage in respect to his physical limitations when he is placed in competition with fellow students who are both physically and mentally nearer maturity than he.

A. RELATIVE IMMATURITY A CAUSE OF SPECIFIC DISEASE CONDITIONS.

While this general statement concerning the handicap imposed on a youth who is relatively immature may pass unquestioned, it can well be asked in what precise manner the alleged pathological results of immaturity are brought about. And it may be profitable to discuss just how immaturity can lead to heart disease, eye strain, acute infections, and many obscure ailments. This can best be done by taking up the three states which accompany immaturity or result from it and tracing their influence on the development of lesions. These three states are (*a*) fatigue, (*b*) overstrain, and (*c*) atony.

(*a*) Fatigue is physiological. It is experienced by all normal individuals as the result of any labor. So far from being harmful we see that it is followed by a grateful lassitude and induces a sound sleep, from which we arise completely refreshed with our physical and mental well-being enhanced and our capacity for further work increased.

The physiology of fatigue is fairly well understood. Although the muscles, nerve fibers, and nerve cells exhibit the phenomena associated with fatigue, they do not, so long as the fatigue is within normal limits, become exhausted. Hence we must locate the principal site of physiologic fatigue elsewhere. We believe that neurons are anatomically independent, and that nerve impulses are transmitted from neuron to neuron across a hypothetical membrane called synapse;

and it has been found that the parts of the neuro-muscular system which do exhibit evidences of fatigue are these synapses, or membranes of junction, between the first afferent tract and the motor neurons.

It is suggested (Sherrington) that the conductivity of this membrane is altered by the physical and chemical changes induced by repeated stimuli, and thus the nerve current encounters increasing difficulty in its transference from one cell to another.

Thus it may be accepted (Adami) that there are two orders of fatigue: First, the immediate, direct muscular fatigue due to the inhibitory action of the products of contraction, and, second, what may be termed conductive fatigue. It is to be noted further, however, that the sense of fatigue is of cerebral origin, and is due to the accumulation of the products of metabolism in the circulating blood in undue quantities.

(*b*) Physical immaturity, always relative in this connection, leads to the body structures assuming burdens beyond their strength, and a state, well recognized pathologically, results, viz, overstrain.[3]

Fatigue is, as I have said, physiological. Overstrain, on the other hand, because of the organic changes resulting from it, may justly be termed pathological. After the latter, the time needed to gain a return to normal, which is not always possible, is all out of proportion to that needed after simple fatigue. Moreover, any organ, instead of being found stronger from the exercise, is distinctly weaker and less capable of responding to a definite demand. The specific results will naturally vary according to the organ and tissue involved and with the grade of work that has led up to the condition. With a muscle, for example, exercise is followed by an increase in its size up to its physiological limit, but if habitually carried past the limits of its power it may atrophy, become fibrous, and exhibit weak, uncertain movements.

Acute and subacute strain may be due to cardiac insufficiency and autointoxication. Chronic strain, with which we are concerned, has an etiology that is not so simple. It may come on when no one act, or series of acts, has seemed excessive, yet the individual who habitually performs muscular exercise above the normal experiences symptoms which can be attributed only to overwork. Instances of this are the pain in the feet and legs of those having to stand all day and the "irritable heart" of soldiers (a condition of cardiac hypertrophy with palpitation and signs pointing to mitral incompetence). Some occupational paralyses may fall in this group. In order to illustrate how overstrain may produce definite pathological changes, particularly in the part on which falls the brunt of the work leading to the strain, I may cite the heart again with the greater intracardiac pressure secondary to prolonged effort, greater

strain is thrown on the valves, which in consequence are more liable to become damaged, and as a further result lesions of either an infective or mechanical type are apt to develop. Riviere's experiments [2-a] graphically show the effects of strain on the hearts of youths. Forty sound boys were taken into the country and allowed to indulge at will in walks and games for a period of one week. Five days after their return 60 per cent showed cardiac enlargement, and this condition persisted in 50 per cent for 10 weeks. The incidence, according to age, is most interesting, as demonstrating the greater susceptibility of the younger boys:

Of boys aged 13 and 14, 3.6 per cent suffered.
Of boys aged 10, 11, and 12, 75 per cent suffered.
Of boys aged 7, 8, and 9, 83 per cent suffered.

Moreover, it has been shown experimentally by Charrin and Roger that animals subjected to forced labor over long periods of time are apt to die with naturally developed infections, and that such animals succumb more rapidly to pathogenic inoculations.

Again, tissues already weakened by other agencies are particularly susceptible to overstrain; or, in other words, that which would cause fatigue in a normal organ induces overstrain in one that is already damaged. I believe that this is one explanation of the prominence given to eyestrain by midshipmen whose complaints are confined to the period of their stay at the Naval Academy.

Pathology of overstrain: The temporary alteration in conductivity of the synapses does not disturb us greatly, nor does the transient toxemia. Overstrain, however, is characterized by effects that are more serious and more lasting. Among them we find poor nutrition and a condition of chronic toxemia which is partly the cause, but chiefly the result, of the various organs being unable to meet the demand made upon them. There are also structural and functional alterations in the nerve cells [4] which indicate an exhaustion of the neurocyte and are evidenced by histologic change in the nucleus, intra and extra nuclear chromatic material and protoplasm. It is probably true that changes similar to these seen in muscle and neurocyte are present in glandular organs, but so little research has been done on them that like conclusions can be drawn only by analogy.

(*c*) Atony: Atony is a result of overstrain which deserves individual mention, appearing, as it does, with great frequency among those who are relatively immature. It is characterized by a loss of tone or vigor in the functions of the body. I can illustrate the importance of the condition by speaking briefly of a single manifestation. If an individual is always "tired"—a common expression which we have seen may cover a state of chronic toxemia and exhaustion of the nuclear material in the neurocytes—he ceases to hold himself erect. The sequelæ of the vicious posture [5] are seen in flat

feet and its symptoms, abdominal ptoses with extensive derangements of the digestive functions, and spinal neurasthenia. The latter affection is brought about in this way: The erector spinæ muscles, being always stretched and atonic, demand and receive less blood. Their blood vessels undergo a species of atrophy, or diminution in size, and, in consequence, the spinal cord, which is supplied by collaterals from the muscular arteries, has its blood supply partly shut off and thereby suffers impoverishment. Many cases of neurasthenia yield to simple static measures designed to correct the posture.

B. RELATIVE IMMATURITY A CAUSE OF FAILURE IN MENTAL EXAMINATIONS.

The preceding references will suffice to indicate the great influence of overstrain in the production of specific pathological conditions and how retarded development may in fact be the prime cause. I may now discuss the question of how immaturity may be a cause of failure in mental examinations.

One of the chief mental characteristics of immaturity is the singleness of its perceptions, both sensory and intellectually. It is impressed with but one quality of an object to the exclusion of its other distinguishing traits. Mental maturity, on the contrary, is characterized by habits of observation and reflection, and by power of sustained progressive thought, so that objects are considered in their several relations. It does not matter whether the tendency to acquire a full and orderly conception be congenital or acquired, nor whether the object conceived by a person, an event, or an idea.

It is probable that this power of coordination and analysis has its anatomic basis in the association fibers of the cerebrum. Animals in which the association paths are already laid down before birth, are in possession at birth of practically the same faculties that are to guide them in later life. Such animals are controlled in every act almost wholly by instinct or racial experience. If, however, the association paths are not fixed before birth, their lines are largely determined by the experience of the individual. Hence, in these cases, the paths will be more numerous and will give evidence of more comprehensive communications. The individual will then exhibit a period of infancy corresponding to the time occupied in the establishment of the complex association paths. It is corroborative that there appears to be a very constant relation between the duration of infancy characterizing a species and the intelligence of the adults of that species.

This characteristic of which I have spoken—the faculty of observation united to the power of reflection, and which we may regard as typical of mental maturity—is the result of so many and diverse factors not susceptible to accurate valuation that it seems impossible

to associate it, in any but the most general way, with anatomic maturity. Nevertheless, since this power has an anatomic basis, and likewise a well-defined period of physiologic development, we may fairly assume that in the young, at least, and those subject to the same educational influences, mental maturity is generally advanced to a degree paralleling physical maturity, and to this extent any adequate method of anatomic age determination will furnish results which retain validity when applied to the mind. As confirming this view, I may refer to the studies of many observers in America and Germany which seem to have established a law that growing youths develop mentally at the same rate of progression as they develop physically. It may be expected, then, that immaturity will lead to failures at examination periods in studies in which proficiency is shown not by feats of memory or exhibitions of successful imitations, but by power of independent thought.

Furthermore, the effects of overstrain and atony on the physical functions, and especially on the brain structure, will usually render mental vigor quite impossible. A youth who never escapes from an overpowering lassitude can not continue to exhibit marked mental activity, and only those endowed with extraordinary vitality and mental vigor can succeed under the handicap imposed by immaturity.

Minot's most interesting studies on the problems of growth and death seem to show that senescence begins almost at conception, but that the rate of senescence becomes progressively lower as age advances. Paradoxical as the statement appears, it can be said that we begin to die at conception and that we are approaching ultimate death most swiftly when we are nearest to the beginning of existence. Thus, the changes that end in death take place most rapidly during intrauterine life, less rapidly during infancy, and most slowly during mature and advanced years. The same idea may be expressed by saying that we gain with years an increased power of self-conservation. This reckless expenditure of what may be called vital capacity—which is a trait of the animal economy in early life—may have an important and not remote bearing on the causation of the effects of relative immaturity.

C. ETIOLOGY OF RELATIVE IMMATURITY.

There are many factors which may cause retarded development. With some we are familiar; concerning others we can only surmise. We know that the thymus influences bone growth, that impairment of the thyroid function produces a number of disorders, many of which are characterized by arrested or stunted development, that insufficiency of the pituitary body causes mental and physical backwardness, and, all organs of the chromaffin system being correlated,

that changes in the parathyroids, adrenals, pancreas (internal secretion) and testicles (internal secretion) may directly or indirectly bring about similar effects. We know, too, that hookworm disease is a common cause of infantilism, and that chronic bacterial infection of the intestine may produce it.[7]

At first thought this question of etiology would seem to be of speculative interest only, but, since relative immaturity may be a result as well as a cause of pathological conditions, it is easy to imagine how its presence may be an indication of already existing disease, or functional insufficiency, and thus be, more justly, the bar to admission and advancement.

II. How Such a Method Can Prevent the Evils Resulting from Relative Immaturity.

Granting that relative immaturity may result in overstrain, and may thus be productive of the serious conditions which I have mentioned, how can the Roentgen or any other method of anatomic age determination serve to prevent the evils mentioned? Such a method will disregard years, and it will take no cognizance of simple stature and bulk, both of which may fail signally to indicate constitutional vigor and powers of resistance, but it will demand that a boy shall have attained a stage in the progressive advance of maturity commensurate with that of his associates. It will thus make it impossible for a boy to be thrown into competition with those that are his superiors in strength and vitality by reason of their advanced years or early maturity. It will insure that the work undertaken shall be proportionate to a boy's fitness therefor. It will not allow a boy's mental attainments to carry him beyond the grade to which his physical development properly limits him. This ideal can be largely realized by making an individual's standing contingent on anatomic age.

Chronologic age will remain the legal measure of an individual's maturity, but now that the sexes and individuals of the same sex are found to vary greatly in their respective rates of development, there is no reason why some adequate standard other than that of years should not be adopted as a basis for grading in schools, provided that a suitable method can be found.

It is common knowledge that a boy of 16 may be so immature that he shows no signs of puberty; yet it is possible, and has indeed happened, that such a youth is admitted to a class in which some of his fellows are completely matured men, and he undertakes necessarily to equal their accomplishments in work and athletics. Such competition is manifestly unfair, especially in a school where the amount, character, and hours of work, athletics, and recreation are uniformly

prescribed. Through it the health and future career of a boy are jeopardized and his education rendered a precarious investment for the Government.

An occurrence of this kind can be prevented by discovering and applying a method of anatomical standardization. To illustrate the application of such a method: If it has been found that most boys of 18 can undertake successfully the work prescribed at the Naval Academy, and if the stage normal to boys of 18 be termed "stage N," then an individual who has arrived at that stage is physically fit for admission, whether his years are 16, 18, or 20. In order to avoid confusion, it seems better to denote anatomic age by letters which represent stages of development, rather than to say that a boy of 18 is anatomically at the stage normal for a boy of 16. The regulations governing admission might then read, not "boys of 16 who pass the required mental and physical examinations," but "boys of class N who pass, etc."

In this way the overstrain, which is almost the inevitable result of any considerable degree of immaturity, would be obviated, and the individual would be conserved to himself, his family, and the service.

The stupid boy will gravitate downward among those who are younger, and he therefore needs no protection. Neither does the normal youth, associating with his equals, demand our attention. It is the precocious boy who has ability, who has been urged on by the pride of parents and instructors, who needs restraint. His admission and advancement, to repeat, should be made rigidly contingent upon his physical fitness—which includes more than freedom from pathological lesions—to undertake the work incident to the requirements. For example, the importance of the determination of complete preparedness becomes evident almost on the day of admission. The newly enrolled midshipman goes to the gymnasium and submits to an examination, which consists essentially of a strength test. Suppose that he is found muscularly deficient. He is then given extra work. If he is fully matured according to his years and his muscles are simply weak from disuse, his strength, and perhaps his health, is improved. But, on the contrary, if his lack of strength is due chiefly to developmental immaturity, the added strain of the extra work required makes an early breakdown certain.

The urgent necessity of discovering some method of grading students which shall be superior to that based on chronologic age is obvious. Many anatomical structures have been studied to learn if they might serve as reliable guides—height, weight, strength, onset of puberty, eruption of the teeth, etc.—but they vary with race, social status, and other unknown factors, and all have been found to be as fallacious in their indications as years have proved to be.

FIGS. 1 AND 2.—SHOWING STAGE III IN RADIUS.

FIG. 3.—SHOWING STAGE IV IN RADIUS.

III. Method Proposed for the Naval Academy.

Dr. Thomas Morgan Rotch, professor of pediatrics in Harvard University, appreciating the desirability of an improved means of grading children in relation to the requirements of schools and child-labor laws, studied the question and tentatively adopted the development of the bones of the wrist as an index of the general anatomical development. The study is still young and many points are yet undecided. It has been shown that the bones of the wrist develop equally with the rest of the skeleton, and that boys and girls differ in their respective rates of development. But as yet we do not possess a detailed study on a large scale which satisfactorily defines the relations normally existing between anatomic appearances and chronologic age, nor is it settled that anatomic and physiologic development progress alike.

When it was first proposed to apply this method at the Naval Academy there were no relevant data obtainable. Dr. Rotch's investigations had chiefly been confined to children under 14 and concerned the times at which ossification began and was completed in the small bones of the wrist. Obviously this method was inapplicable to young men upward of 16. I suggested that a study of the process of amalgamation between the epiphyses and shafts of certain long bones might yield results comparable to those obtained by the Rotch method among children.

IV. Objects of the Present Investigation.

This suggestion was adopted and the investigation undertaken with two objects: To determine what value, if any, the method possessed; and, if it should be found deserving of adoption, to get sufficient data as to normals for its subsequent application to the examination of candidates presenting themselves for admission to the Naval Academy. It was hoped, also, that some anatomic information of value might be derived incidentally from the study concerning the union of the epiphyses.

V. Plan of Work.

1. An individual folder was to be prepared, which should contain the following information concerning each midshipman. The "Group" refers to a classification based on the strength test conducted by the medical officer in charge of physical training.

Group AA.—Approaching ideal physique.
Group A.—Normal physique.
Group B.—Doubtful cases.
Group C.—Frankly defective cases.

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The other headings are self-explanatory.

No. (series number).		Date.
Name.		Graduates.
Age on date.		
Height.	Weight.	Group.
Social status.		
Parentage.		
Home hygiene.		{City. Country.
Previous diseases and notes.		
Actual age.		
Apparent age.		
Radiographic age.		
Priut of elbow.		
Print of hand.		
Tube, soft, hard.		
Amperage.		Distance of tube.
Milliamperage.		
Internal epitrochlear; union.		Line.
External epitrochlear; union.		Line.
Olecranon; union.		
Radius, head; union.		Line.
Radius, lower; union.		Line.
Ulna, lower; union.		Line.
Metacarpals; union.		Liues, 2.
		Lines, 3.
		Lines, 4.
		Lines, 5.
Sesamoids.		
Phalanges; union.		Lines, 2.
		Lines, 3.
		Lines, 4.
		Lines, 5.

2. Roentgenograms were to be taken of the elbows and hands of all the men in the academy.

3. These were to be studied to learn what stages in the process of amalgamation could be clearly distinguished.

4. After the stages were determined, each epiphysis of each individual was to be inspected and labeled with a number indicating the stage to which it belonged.

5. A chart was to be made of each stage of each epiphysis on coordinate paper—the ordinates to represent the number of men and the abscissæ their respective ages, so that the height of the column over any age (figs. 11 to 21) would indicate the number of men of that age in whom the given bone had reached the given stage. The serial numbers by means of which the columns were to be built up serve to mark the position of any individual. Thus we learn from "Radius stage 5" that there were in the Naval Academy 3 men of 20 years whose radii present that stage of development. We also

FIG. 4.—SHOWING STAGE V IN RADIUS.

FIG. 5.—SHOWING STAGE VI IN RADIUS.

learn from this chart how many men there are altogether who have reached that stage, the percentage they constitute of the total, the age distribution of the men entering into the curve, and their identity. By this means it was hoped to obtain a curve which, by its highest point, should indicate the age at which the stage should occur, and by its relatively higher points the limits of normal variation.

For instance, we learn from the folder that John Smith is 20 years old and that his radius is in "stage 5." On "Radius stage 5" chart, in column "20," we shall find John Smith's serial number. Or, we take a plate of an individual whom we wish to standardize. His radius is shown to be in "stage 5" and his age is given as 20. Then, the height of column "20" on "Radius stage 5" in relation to the other age columns should show whether this individual is normally matured, precocious, or delayed, and to what extent, in years. From the other stage curves of the radius it should be possible to say—if John Smith's radius is in "stage 5," when a man of 20 should normally appear in "stage 7"—that he is delayed by two stages, or is in "class N" when he should be in "class P."

6. It was almost certain that the form of these absolute curves would be largely determined by the chance general distribution of individuals of the various ages, and would in this way be less indicative of the age distribution of the men in any stage than if there were an equal number of men of each age among the total number examined. Since there are in all few men of 17 and many of 19, disproportionate weight would be given 19 in all the curves.

In order to level the general age distribution it was first necessary to find the number of men of each age in the total number examined. This was to form a general age curve (fig. 9) and later, a similar curve based on anatomic age was to be constructed.

FIGURE 7.—*Table of averages showing number of men in each stage, and their average age.*

Chart.	Ulna.		Radius.		Metacarpal.		Phalanges.	
	Men.	Average age.	Men.	Average age.	Men.	Average age.	Men.	Average age.
	Number.		*Number.*		*Number.*		*Number.*	
I	2	17:1½	None.	....	None.	....	None.	....
II	5	17:6½	4	17:3	6	17:2	2	16:3
III	25	17:10	23	17:8	8	17:10	5	17:3
IV	84	17:11½	92	18:+	23	17:3½	4	16:11
V	36	18:8½	66	18:8½	11	17:9½	12	17:5½
VI	98	19:4	232	19:10½	35	18:7½	17	17:10
VII	212	20:+	398	20:6	378	20:2½	469	19:10+
VIII	450	20:8	99	21:1	454	20:1½	404	20:4
VII and VIII	....	....	....	....	832	20:1½	873	20:0½
Total	912	....	914	19:11½	915	....	913	....

7. Then a percentile curve was to be placed on each stage chart (figs. 11 and 21), this curve to represent in any column the percentage of all the men of that age who are found on that chart. For example, there were 8 men in the Naval Academy who were 17 years of age. Of these, 1, or 12.5 per cent, occur in "stage 5" of the radius. Hence in the "17" column, "Radius stage 5" chart, we find an absolute number of 1 man, and a percentile number—13 per cent. In this way, as I say, an effort was made to approach the ideal conditions in which each age, among the total number of men examined, should be represented by an equal number of individuals.

8. Averages were to be obtained (fig. 7) which should corroborate the normals as indicated by the curves.

9. Having obtained from my percentile curves the normal points, and the limits of normal variation, I hoped to be in a position to standardize each individual, noting his departure from normal, its direction and its extent.

10. Up to this point the immediate aim of the work was to get sufficient anatomic data on which to proceed; that is, to evolve the normal standards without which anatomic age determination would be impossible. Having accomplished this and having standardized each individual and noted any discrepancy between chronologic and anatomic age, it was then proposed to undertake a statistical study having as its object the demonstration of the influence of relative immaturity on the production of defectives.

To this end, it was intended to find:

a. In the total number—
  The per cent of cases—
    Normal.
    Precocious or anticipated.
    Retarded or delayed.
b. Of the normals—
  The per cent presenting defects in—
    Physique.
    Weight.
    Heart.
  Total per cent presenting defect.
 Of the precocious—
  The per cent presenting defect in—
    Physique.
    Weight.
    Heart.
  Total per cent presenting defect.

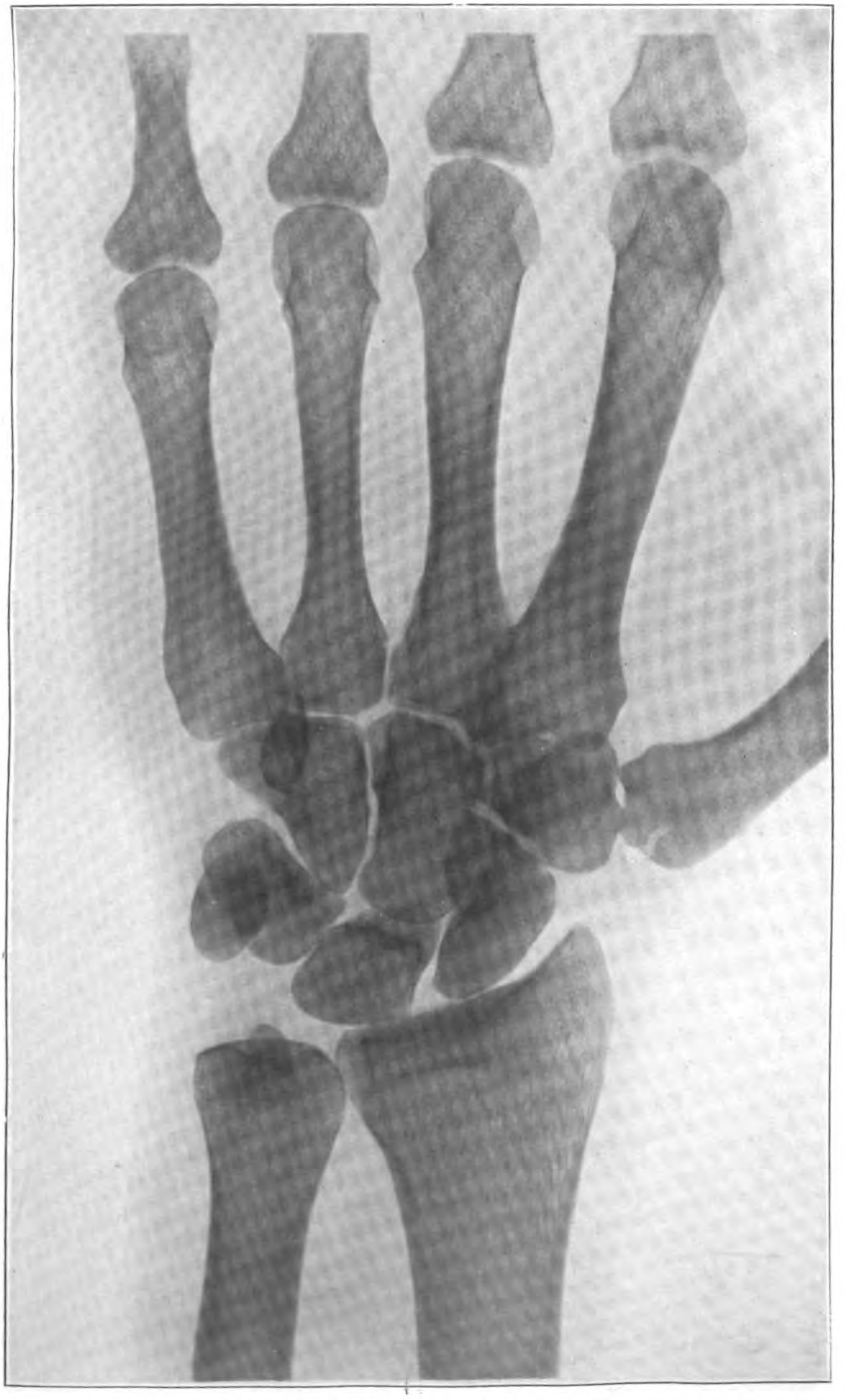

FIG. 6.—SHOWING STAGE VII IN RADIUS.

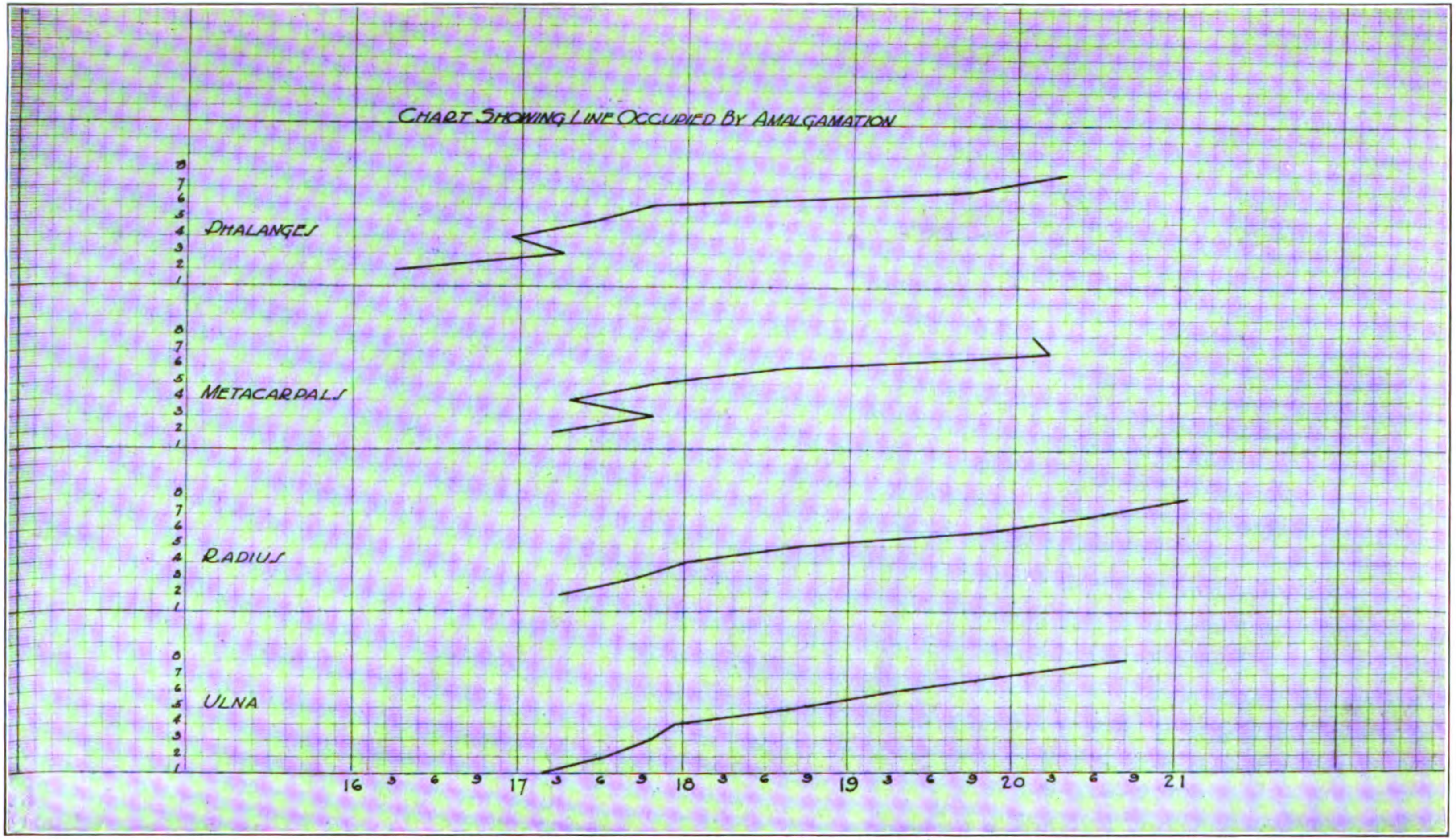

FIG. 8.—SHOWING TIME OCCUPIED BY EACH BONE IN THE PROCESS OF UNION. THE ADVANCE IS INDICATED BY THE AVERAGE AGE AT WHICH EACH STAGE OCCURS.

Of the retarded—
The per cent presenting defect in—
Physique.
Weight.
Heart.
Total per cent presenting defect.

c. And, conversely, to learn—
The per cent of defectives in—
Physique, retarded.
Weight, retarded.
Heart, retarded.

d. The per cent of those whose height and weight were beyond average who were retarded.

e. In order to show the relation that might exist between maturity and mental standing—
In the upper half of classes—
The per cent of cases—
Normal.
Anticipated.
Retarded.
In the lower half of classes—
The per cent of cases—
Normal.
Anticipated.
Retarded.

f. And, conversely—
The per cent of normal cases in—
Upper half.
Lower half.
The per cent of anticipated cases in—
Upper half.
Lower half.
The per cent of retarded cases in—
Upper half.
Lower half.

With this statistical study in mind, lists were obtained which are here summarized without comment.

In a total of 914 men, there were—

109 cases of defective physique (12 in 707—W. N. McD.; 97 in 207—J. F. M.).

142 cases of underweight.

229 cases of heart affection.

The presence of underweight was determined by a departure of more than 10 pounds by men under 130 pounds, and of more than 15 pounds by men over 130 pounds, from averages for both height and age. The tables are submitted as a matter of general interest.

Averages, for all ages.		Averages of height-age, from 16 to 19 years.	
Height.	Weight.	Height.	Weight.
Inches.	*Pounds.*	*Inches.*	*Pounds.*
62	116	62	120
62.5	118	....	....
63	120.5	63	117.5
63.5	122	....	....
64	123	64	117
64.5	128	....	....
65	132	....	....
65.5	134	....	....
66	135.5	66	128.25
66.5	137.5	....	....
67	139.5	67	131.5
67.5	141.3	....	....
68	143.2	68	133
68.5	145.5	....	....
69	147	69	137.25
69.5	148.5	....	....
70	150	70	141
70.5	153	....	....
71	155	71	145.33
71.5	158.3	....	....
72	160.9	72	151.66
72.5	163	....	....
73	168	73	151
73.5	170	....	....
74	171	74	158.66

Height.	Weight.			
	16 years.	17 years.	18 years.	19 years.
Inches.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
62	130	110	117	120
63	....	....	117	118
64	108	116	119	125
65	120	125	122	138
66	136	120	125	132
67	131	130	131	134
68	128	131	136	137
69	130	135	140	144
70	135	140	144	145
71	....	144	144	138
72	....	150	149	156
73	160	....	148	145
74	....	155	148	165

Number examined 16 years of age, 45. Average height, $67\frac{5}{9}$ inches; average weight, $130\frac{8}{9}$ pounds.

Number examined 17 years of age, 234. Average height, $67\frac{7}{10}$ inches; average weight, $130\frac{1}{12}$ pounds.

Number examined 18 years of age, 303. Average height, $67\frac{3}{5}$ inches; average weight, $135\frac{1}{4}$ pounds.

Number examined 19 years of age, 512. Average height, $67\frac{9}{10}$ inches; average weight, $140\frac{12}{13}$ pounds.

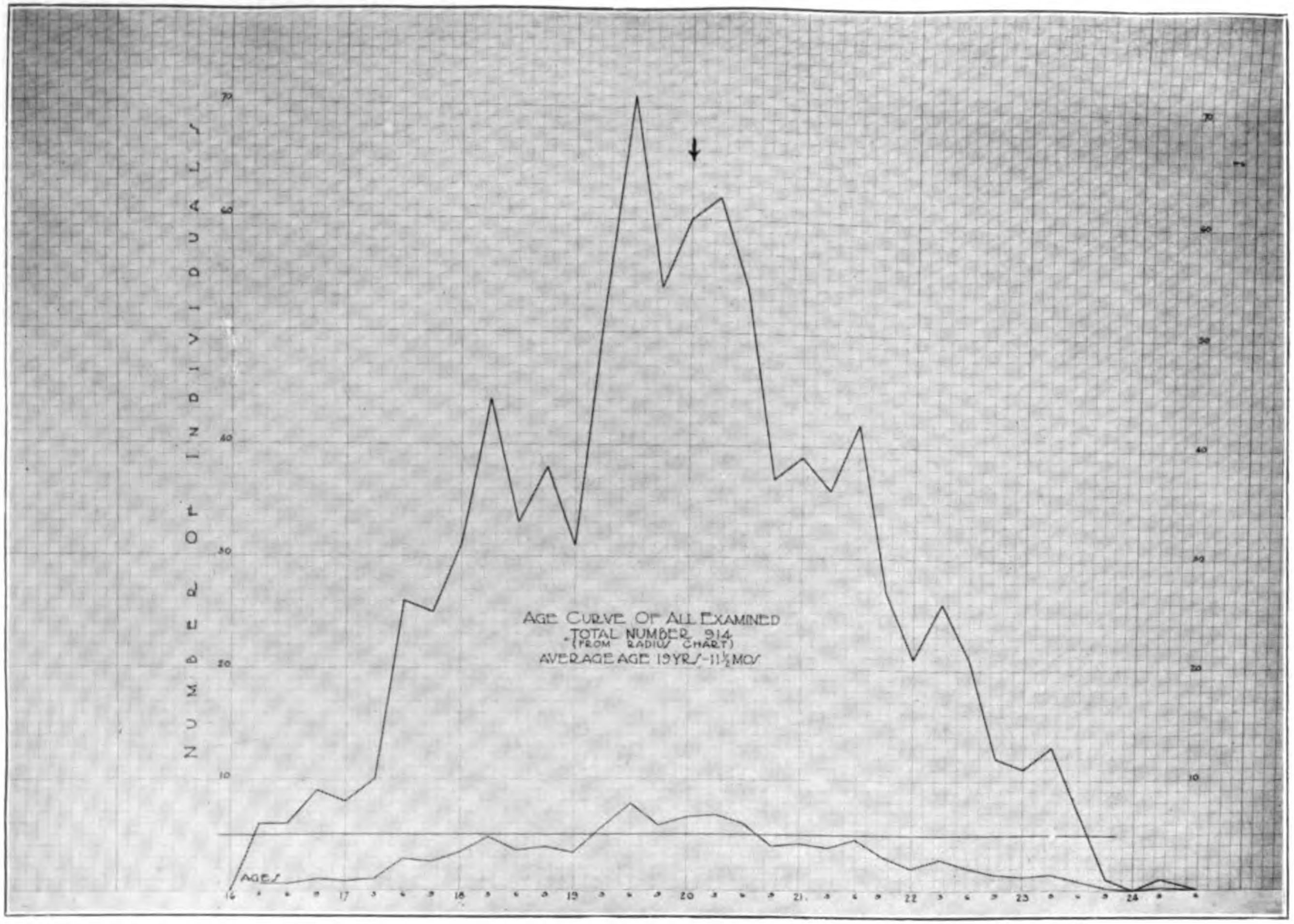

FIG. 9. GENERAL AGE CURVE OF ALL EXAMINED, SHOWING ABSOLUTE NUMBER OF MEN OF EACH AGE AND THE PERCENTAGE THEY FORM OF THE TOTAL.

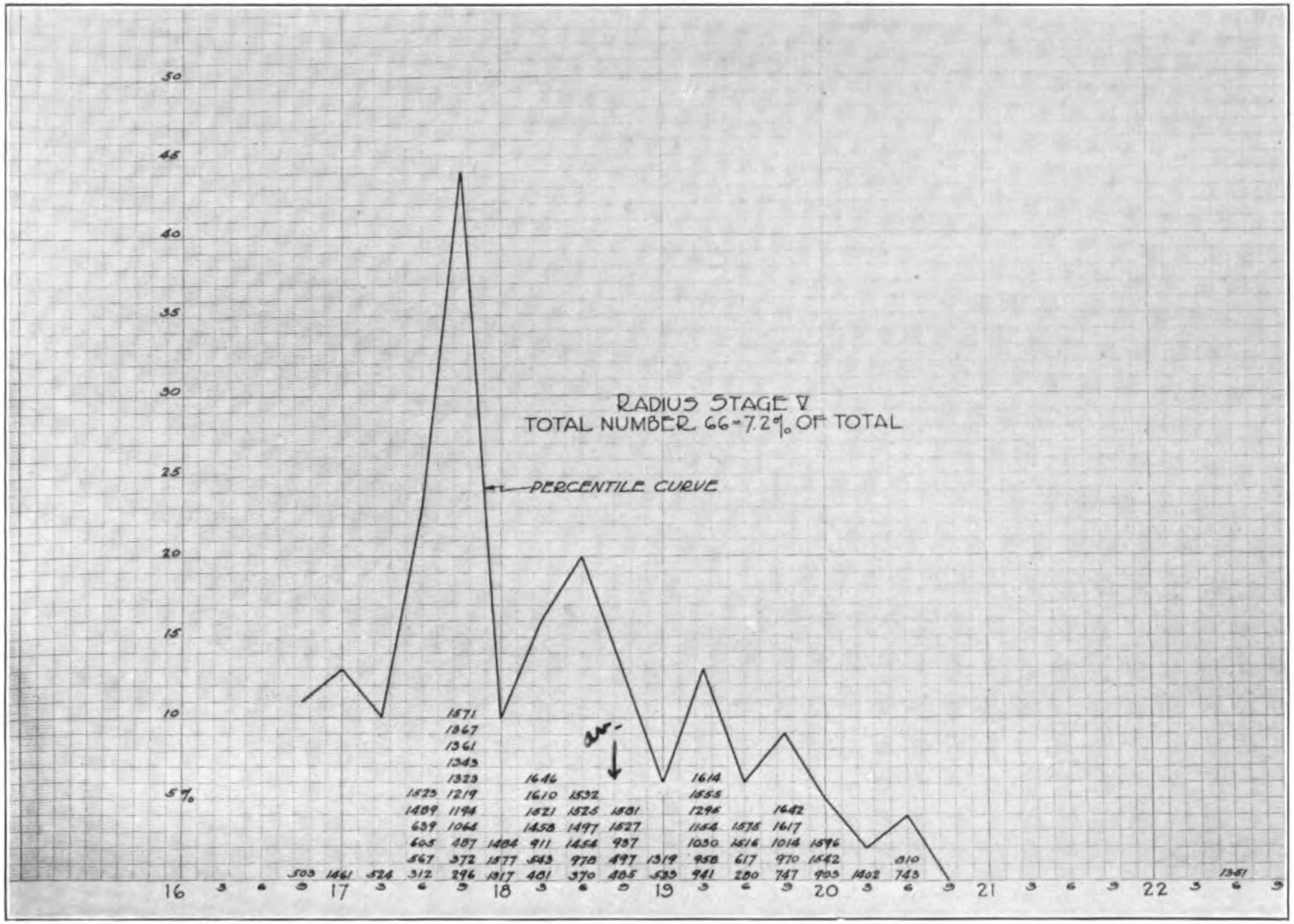

FIG. 11.—STAGE CURVE; RADIUS, STAGE V.

The physical records from 1899 to 1908 show the following averages:

(1) The average height and weight of 153 men from 15½ to 16½ years is: Height, 65$\frac{8}{10}$ inches; weight, 126$\frac{3}{10}$ pounds.

(2) The average height and weight of 519 men from 16½ to 17½ years is: Height, 66$\frac{4}{10}$ inches; weight, 128$\frac{2}{10}$ pounds.

(3) The average height and weight of 733 men from 17½ to 18½ years is: Height, 67$\frac{7}{10}$ inches; weight, 135$\frac{8}{10}$ pounds.

(4) The average height and weight of 1,056 men from 18½ to 19½ years is: Height, 68$\frac{4}{10}$ inches; weight, 140$\frac{7}{10}$ pounds.

Average strength, height, weight, and age of each class for 1910.

Class.	Number midshipmen.	Total strength.	Weight.	Height.	Age.
			Pounds.	*Inches.*	*Yrs. mos.*
1910	133	6,346	146.2	68.3	22 4
1911	201	6,395	146.1	68.2	21 3
1912	190	6,397	146.3	68.1	20 6
1913	191	6,099	144.1	68.2	19 4

Average strength, height, weight, and age of brigade of midshipman for 1910.

Number of midshipmen.	Total strength.	Weight.	Height.	Average age.
		Pounds.	*Inches.*	*Yrs. mos.*
715	6,309	146.6	68.2	20 10½

VI. Description of the Method of Investigation.

In my report, submitted in October, 1909, I estimated that at least two years would be required in order to obtain a sufficient number of examinations to give weight to whatever conclusions might be drawn from the investigation. Although but one year has elapsed, I have succeeded in getting plates of all the men in the Naval Academy during two academic years. I have taken 1,654 plates of 914 men. After 1,447 plates had been examined, it became evident that no information would be derived from the study of the elbows of men of the age of these midshipmen, and, therefore, all my conclusions are drawn from the study of the wrist plates. Otherwise the work progressed much as planned.

The 14 epiphyses selected for study (see p. 10) were examined, and a careful description made of the appearances found. When descriptions had been written of each of the 14 epiphyses in 723 individuals, it was found possible to divide the process of amalgamation into several stages. It was not attempted to make the stages conform to a certain predetermined number. On the contrary, it was found on the completion of the primary examinations that the stages

that could be clearly distinguished were 8 in number. I emphasize this because it is the only point in the whole study which depends on my personal judgment, and it is of vital importance.

STAGES SELECTED.

The first sign of union seems to be the appearance of a minute, disk-shaped center of ossification in the clear space representing the cartilage, but close to the epiphysis. Others appear close by, and they become heaped up, forming what I term imbrications. As they multiply, they increase in size and some coalesce. Other terms used in the description of the stages are self-explanatory.

Stage 1. Complete separation, with no sign of beginning union.

Stage 2. Complete separation, but a few imbrications appear in the clear cartilage.

Stage 3. The imbrications have reached the proximal side, so that the clear line of cartilage is interrupted by them. In the radius this occurs to the outer side of center.

Stage 4. The imbrications have accumulated, so that they occupy the cartilage space except at the periphery. They have enlarged and, to a large extent, become fused, the cartilage space being represented by interlacing multiple lines, formed by the spaces between the disks. There is still wide peripheral separation.

Stage 5. The multiple lines have contracted to a thick line, which may show traces of irregularity. There are deep peripheral notches.

Stage 6. The thick line has become narrow, but is distinct and extends the full width of the bone. There usually remains a slight notch or depression at the periphery.

Stage 7. Only portions of line or traces of notch remain.

Stage 8. Amalgamation is complete.

The table in figure 7 gives the average ages at which the stages occur in each of the four bones studied.

It will be noted from a study of the figures illustrating the stages that union in the ulna and radius is first completed at or near the center. This is not quite true of the phalanges. With them the center is delayed and union is first completed in an intermediate zone, then in the center, and lastly at the periphery. The peripheral union may occur almost coincidently with the central, or even before. Usually there is thus left a space in the center which contracts to a double line and then to a thick line, which becomes shorter and may finally disappear, but which often persists in many individuals far into the twenties, long after similar lines have disappeared from the other bones. In spite of this slight variation in the process of union, the general division of stages is applicable to the phalanges.

Union does not occur coincidently in the various metacarpals and phalanges, the order in which they unite being—for the metacarpals—

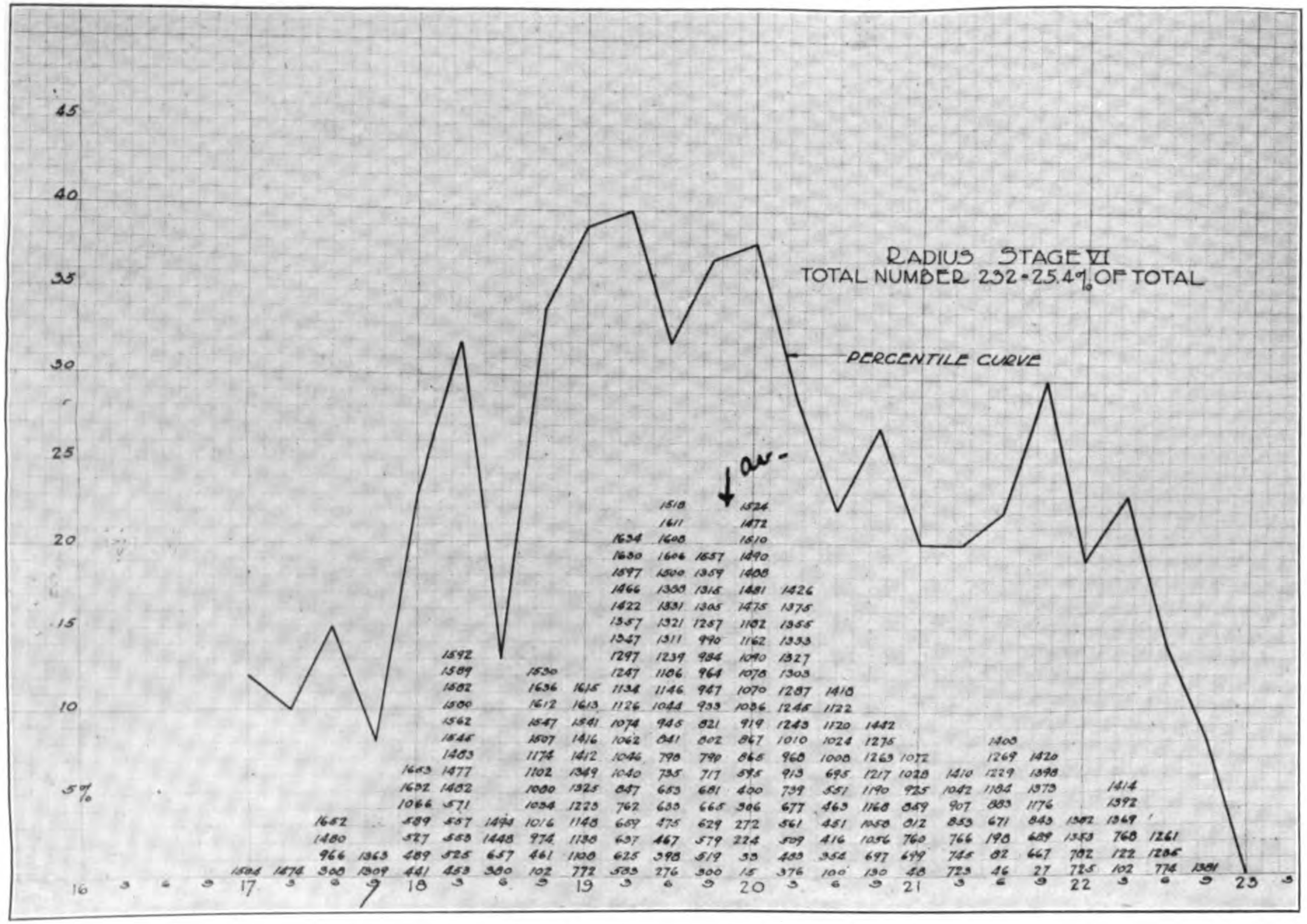

FIG. 12.—STAGE CURVE; RADIUS, STAGE VI.

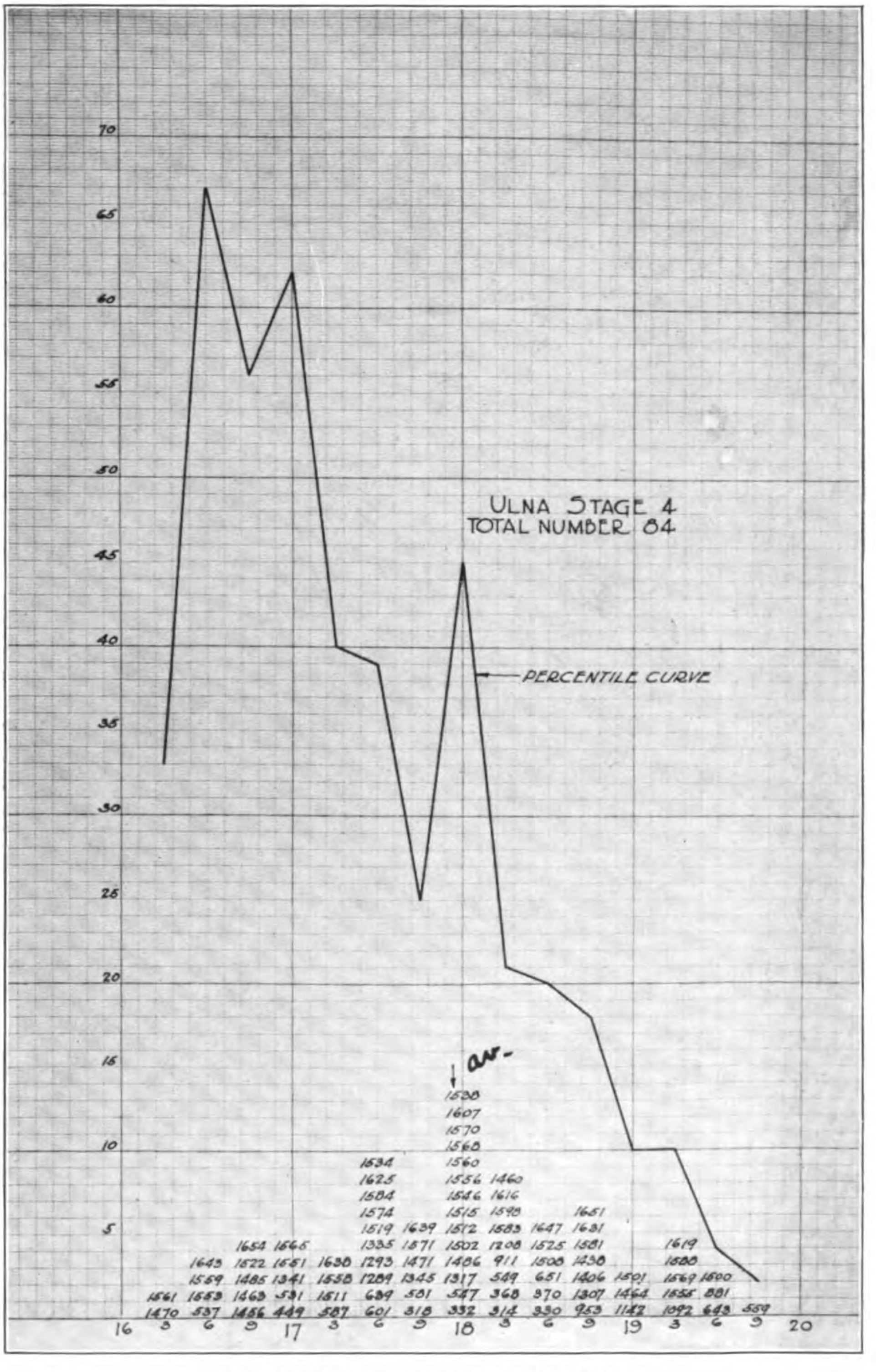

FIG. 15.—STAGE CURVE; ULNA, STAGE IV.

first and third, then the second and fourth, and lastly the fifth. For the phalanges, first and second, then the third and fourth, and finally the fifth.[6] The thumb metacarpal is morphologically a phalanx. Each metacarpal and phalanx has but two centers of ossification, one for the shaft and for an end. The epiphysis is at the distal end of each of the four inner metacarpals and at the proximal end of the thumb metacarpal and of each of the primary phalanges. This fact enabled me to include them all on one plate, together with the lower ends of the radius and ulna.

The secondary and tertiary phalanges also have their respective periods of union, but they have not been recorded in this study. In fact, the metacarpals and phalanges have been recorded collectively and more attention has been given the ulna and radius. The radius has been chosen for particular study, since its amalgamation requires a longer period of time (see fig. 8) for completion.

The stages having been selected by the preliminary study, all the plates were again examined and the proper stage number given to each epiphysis according to its appearance. When this had been done, the construction of the curves was begun. An example of the method pursued may be given.

John Smith, series number 657, age 18 years 6 months. The lower radius was seen to be in stage 6, and the lower ulna in stage 5. Then, on "Radius stage 6" chart, in column "18–6," the number "657" was placed. Similarly, on "Ulna stage 5" chart, in column "18–6," 657 was inserted. Thus each chart includes all the men of whatever age in whom the development of the given bone could be said to grade the individual in that stage.

Thirty-two such charts were found, one for each of the eight stages of each of the four bones—radius, ulna, metacarpals (collective), and phalanges (collective). Then percentile curves were made as follows: There were 8 men in the Naval Academy 17 years of age; 1 was found to be in stage 6 of the radius and none in stage 5 of the ulna. Therefore, on "Radius stage 6" chart, column "17," 12 per cent was marked, and on "Ulna stage 5" chart, column "17," 0 per cent marked. A glance at figures 9 and 12 will make the derivation of the percentile curves clear.

VII. Comment.

In view of the results obtained, it may well be urged that I did not select the stages wisely and that had I used better discrimination the results would have been different. I can only say that I approached the selection with a perfectly open mind, that at the time I could have had no idea of the final outcome of the work, that the stages differentiated themselves to me as the work progressed and their number was not arbitrarily fixed at the beginning, and that

further study has confirmed me in my opinion that the stages as described can be clearly distinguished and are the only ones capable of satisfactory differentiation. The tabular statement (fig. 7) showing the advance of age with each stage substantiates this belief.

It is, of course, indisputable that the percentile curve does not fully accomplish its purpose. Where very few men enter into this formation, its significance must be lessened to an extent corresponding to the chance of erroneous values. The percentile curve does, however, seem to be the fairest way of equalizing the effect of the general age curve.

To review—each stage curve was expected to show the age at which that stage should occur and also the limits of normal variation. But the curves failed signally to show either. There are seldom well-defined high points, or relatively high points, and when present they differ greatly from the averages. All the curves are not produced for lack of space and because too few cases (see table, fig. 7) belong to certain stages for those stage curves to have any value. From an inspection of 5 stages of the ulna, 5 stages of the radius, 1 of the metacarpals, and 1 of the phalanges it has been demonstrated how impossible it is to state the age at which any stage should occur and, most important, the limits of normal variation. There were instances which brilliantly illustrated the principle, but these were isolated cases.

The question of how to find normals was then approached in a different manner. I endeavored to find the stage which should be present at each age. The same general result was obtained, as might have been expected. Any one stage was common to so many ages that still no normals were evolved. This in spite of the fact, as shown in table, figure 7, that each stage, so far as the averages may be conceded value, represents a marked advance in years. The other curves on the charts showed how gradual was the advance in stage and how broad the limits of variation must be. So far as I can interpret these curves, they indicate only the general law, which has been known for a long time, certainly, that as maturity is approached the epiphyses of long bones effect a junction with the shafts, and that the advancement of the process depends in a broad way on the age of the individual.

It was early recognized that neither absolute curves, percentile curves, nor averages might be the fairest indices of normals, and that points created by the massing of individuals, the location of the greatest number, might better indicate normals by excluding all wide departures. Curves constructed on this principle were least valuable as indicators of normals.

Further efforts were made by the formation of "three-point" curves, but they also were fruitless.

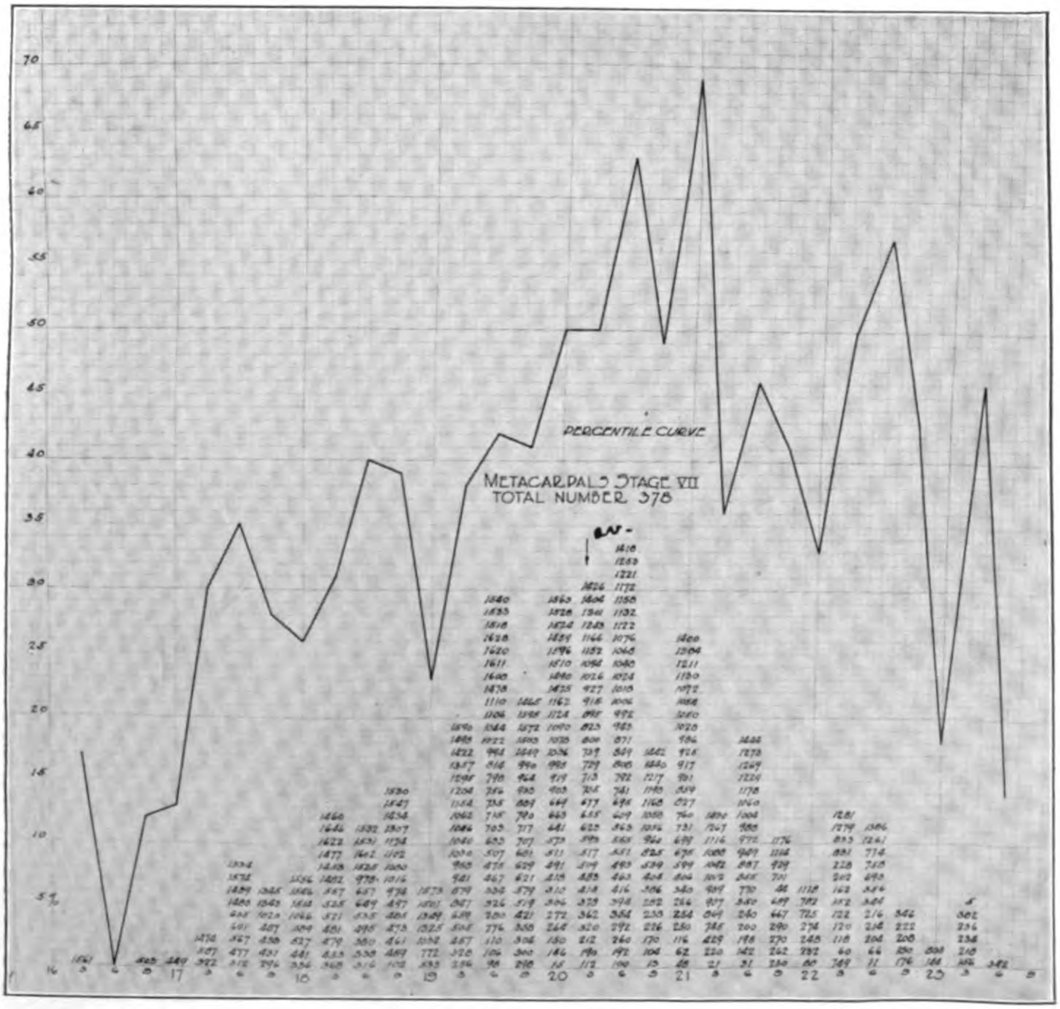

FIG. 20.—STAGE CURVE, METACARPALS, STAGE VII.

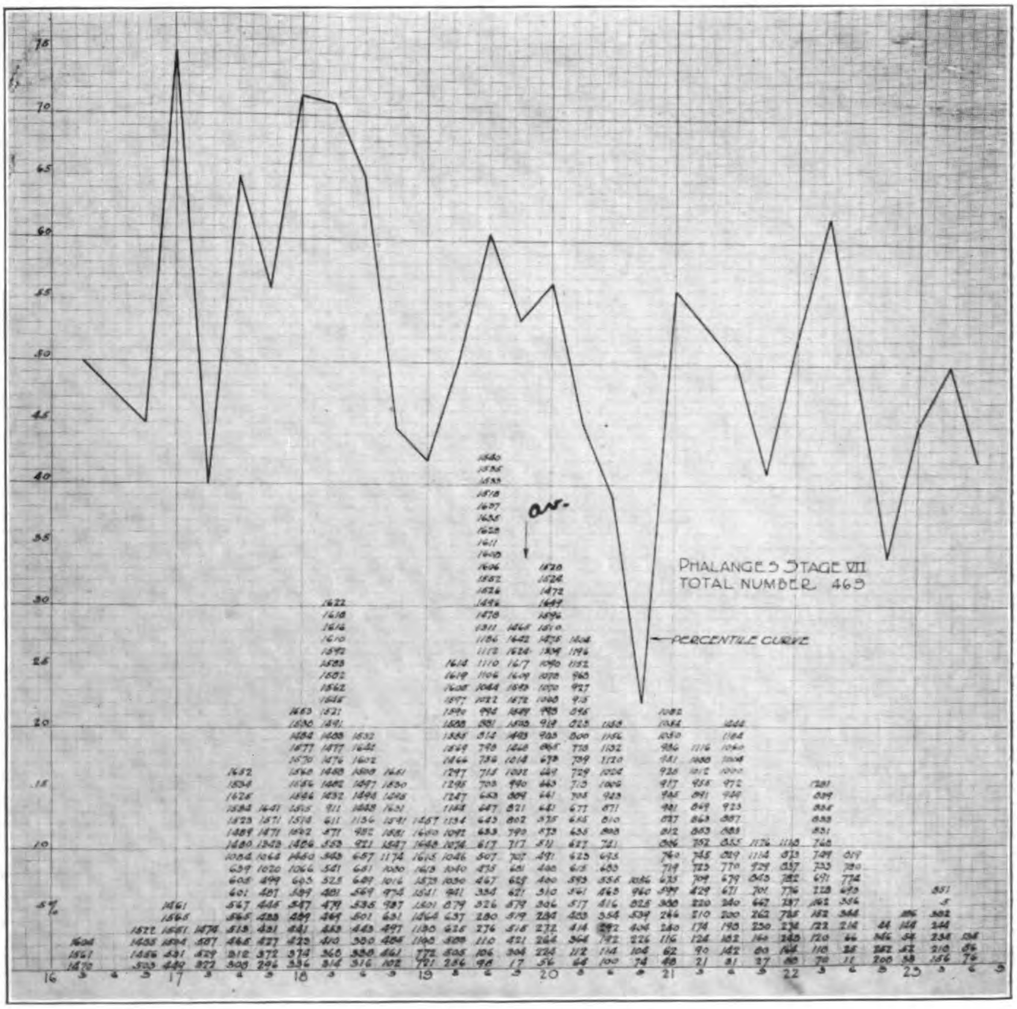

FIG. 21.—STAGE CURVE; PHALANGES, STAGE VII.

This inability to secure normals is the more disappointing in that at the Naval Academy the midshipmen are selected by senatorial and representative appointment, and may therefore be considered to represent fairly the population at large, in city or country residence, geographical location, distribution of population, races, and social status. They must pass a rigid physical examination at admission and annually thereafter, so that they should be singularly free from wide departure from a healthy standard. The results, negative though they are, must be conceded peculiar weight from these circumstances.

The table of averages (p. 15) shows that among men of 19 to 22 height, weight, and strength increase little, if at all, with increase in years; and I may say that this is broadly true for anatomic development so far as it is indicated by the epiphyseal method of determination. The increased span of the curves representing the most advanced stages also goes to confirm this belief. Younger individuals are needed for this study, since the results, if found valid, will apply mainly to them. Many years would be needed to secure a reasonable number of observations in the Naval Academy on youths of suitable age, and the study can be more profitably pursued in preparatory or high schools. I have observations on so few individuals belonging to the younger stages that my results from them must carry little weight.

VIII. Summary.

Thus, the study was stopped by my inability to determine normals, without which standardization or comparison was impossible. It being practicable only very rarely, and then in extreme cases, to say that an individual is normal, precocious, or delayed, the statistical study that was to demonstrate the value of the method was not feasible.

The method, therefore, does not furnish among subadults suitable normals by means of which standardization can be carried out. In this respect it fails, as do other similar methods, to supplant the chronologic system of grading, however defective that system may be.

This work in nowise bears on Dr. Rotch's observations on children.

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PHYSICAL TRAINING IN THE UNITED STATES NAVAL SERVICE.[1]

By J. A. MURPHY, Surgeon, United States Navy.

Exercise in the naval service may be considered in connection with its relation to the officer, to the enlisted man, to life on shore and afloat, to the variety available, to the work or play of the day, and to its effects good or bad.

Until within a few years official recognition of the need of special forms of exercise has been limited more or less to the physical exercise drills—sword, bayonet, physical drill with arms, and physical drill without arms. In the days of sailing ships the enlisted force were generally active, well-developed men, obtaining frequent muscular exercise through force of circumstances, in lieu of which there must now be provided some scheme of compulsory physical training. Officers were also as a class of better physique, principally because the demand was less than the supply, so that selection, both mental and physical, was carried to a higher degree.

The modern navy has expanded rapidly, and conditions on shore and afloat have changed, both from the hygienic and the physical standpoint. A great part of the crew now work below decks in heated and doubtful atmospheres; motor power is replacing hand labor in boats and on shipboard; physical shore drills, like infantry and artillery, are of less importance than the necessity of perfecting great-gun drills in place aboard ship; while mental tension and responsibility is increasing, with attendant drain on physical strength.

To compensate for the bad effect of these recognized altered conditions executive authority has prescribed physical exercise for officers, and the Navy Department has encouraged athletics in many ways for the enlisted personnel. Failure to obtain satisfactory results comes

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[1] Read before the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., Sept. 23–28, 1912.

from various causes. The physical drills soon become monotonous, consisting of the same series of movements day in and day out, while the basic principle of progressive uniform development is not present through lack of some method by which weakness followed by improvement can be demonstrated. There is no special corps of instructors to keep alive the personal interest and to correct faults, the time allotted is short, and the system lacks command, so that control is soon lost and the movements become perfunctory and spiritless.

The officers' walking test is better than nothing, but hardly sufficient to give the individual a daily work out of all his muscles, or to improve the strength of his upper limbs and body. Athletics, being voluntary in character, only reach those who feel inclined to indulge, these few individuals among many being usally the well-developed physiques for whom one should ordinarily have no feeling of worry.

On shore opportunity does not always exist for systematic exercise in the usual ways, most naval stations lacking a gymnasium, or adequate area which can be devoted to voluntary physical training. Afloat opportunity is still further restricted.

The peculiar conditions, not felt ordinarily in civil life, during the more or less lengthy periods of work under discipline and responsibility of varying degree, affect the personal inclination, the hours off duty being devoted to family, or to pleasure of non-athletic type, for the freedom and relaxation that goes therewith.

Unlike civilians, who as a rule remain in the same locality, the chances of naval men becoming active members of athletic organizations or clubs are slight, lack of example being a factor here.

Under the American system of making specialists out of a few individuals, the primary idea of exercise would seem to tend to the creation of a desire on the part of a few to excel in doing feats of skill and strength, and to the many a desire to view such displays; the rounding out, uniform, and healthful development of all individuals being a secondary instead of a primary consideration. It follows that for many individuals there is created no actual liking for exercise, these persons never having really felt the well-being that comes from a proper dosage, exercise for the athletes having been made a drudgery in order to obtain excellence in condition and teamwork, all pleasurable sensations being lost in the lust for conquest. The athletes therefore, unless they make their living thereby, soon give up their methods of obtaining exercise because of dislike, or inability to gather others together for a contest, or from lack of a field of play, while the nonathletes, having learned no other form of athletic pleasure than that of viewing others perform, go the way of the ignorant.

Observation of hundreds of applicants for enlistment or appointment in the service, particularly in the case of youthful candidates

for midshipman at Annapolis, supposedly the selected of the land (many having passed through college or preparatory schools where opportunity for physical training at the present time is excellent), shows a most marked neglect of personal knowledge in the use, and lack of results in the application, of exercise to the improvement of defects in physique, these young men for the most part being flat chested, round-shouldered, with head dropping and hips carried forward, and spine distorted; unhealthy skins, poor circulation, and frail musculature often completes the picture. Of the few who are well developed many have exaggerated certain parts so as to have become defective in posture. Their muscles are reduced in range of movement from continually doing heavy work of the same character and from unequal development of antagonists, so that they are muscle bound, awkward, sluggish, and when attempting to apply their power fight the effort through lack of coordination.

These young men, both weak and strong alike, are all well grounded, however, in exercises commonly classed as sports, which, from the results, appear to be more popular through desire for fame, poor advice, or lack of restriction, than basic exercises which would have prepared the body by correction of its physical faults for the strains of effort.

At the United States Naval Academy, where at the present time physical training is considered of great importance, all forms of exercise, both voluntary and compulsory, are encouraged under certain restrictions of various kinds.

The assigned compulsory forms of exercise are made up of drills and athletics. The athletic drills being infantry, artillery (field pieces drawn by hand), great gun (using dummy bags and shell of same weight as standard charge), mines, seamanship (rowing and sailing boats), gymnasium, and sword. The compulsory athletic contests between classes, divisions, and companies are rowing (cutter, three-fourths mile), tennis, gymnastics, wrestling, swimming, fencing, handball, bootball, basket ball, baseball, lacrosse, and field and track.

The drills are both outdoor and indoor, and in addition to those regularly assigned as part of the academic course others are assigned as competitive. The compulsory athletic contests in the different seasons are restricted to individuals not members of the Navy squads in each sport, so that there are very few of the total number of midshipmen who at some time are not engaged in athletics.

Voluntary lines of effort in which the midshipmen engage for recreation or collectively represent the institution against other colleges are of the usual kind: Crew racing, football, basket ball, track and field, baseball, lacrosse, wrestling, swimming, gymnastics, tennis, fencing, golf, handball, walking, horseback riding, and bicycling.

In connection with the above it might be noted that the aim of exercise should be to correct faulty posture or deformities; strengthen weak muscle groups; improve nervous control and coordination to obtain a quicker response to the will; improve the appetite, digestion, and absorption, thus improving metabolism so as to increase body weight (muscle) and burn up excess of food (fat); and to strengthen the heart and lungs; the body being placed in a position best adapted to meet the daily demands of life brought out by the strain of physical and mental activity.

The effect on physique of constant discipline, compulsory study hours, examinations, youth, natural ambition frequently accentuated by reward for excellence, rivalry, urging of professional coaches and trainers, and desire for fame is not always considered in conjunction with excessive physical exercise. These combined effects often lead to insidious overdoing, particularly when there is failure to remember that exercise should be recreational or developmental in character, when endurance is cultivated rather than skill and team work for short periods, and when the question of unnatural fatigue is lost sight of.

The primary object of the interclass drills and games is to stimulate an interest in the various exercises and to force as many individuals to engage in physical improvement as possible, the secondary object being to devolop material for the first teams. (This last is the predominate idea in the American scheme of physical training and is responsible for the poor results so far observed.) Class contests are more in the nature of recreational strife, making the exercise one of play instead of work. There is no necessity for arduous training, due to the lessened speed and form expected from the contestants, and to the fact that winning or losing is not a vital point, the players being able to conserve their strength by slowing up when fatigued.

In the development of teams for inter-institutional contests the peculiar mental state affecting coaches (due to thoughts of prestige or finance usually) and players (effect of esprit de corps) brought out by fear of losing, has usually evolved an excess of zeal both on the part of those engaged in the various sports, as well as in those charged with the production of a winning combination. This mental state forces matters, there being no time for progression, and with failure to realize that shortness of season, lack of previous preparation, press of studies, relative immaturity, and effect of constant discipline, may be exerting a drain on vitality, results are not always as expected. In the production of a winning team the professional coach is thinking very little of the future of his subject, but a great deal of obtaining what he terms material, which really means the survival of the fittest. Commercialism is a strong factor in the athletics of to-day.

Certain sports have the endurance element prominently to the front, and it is frequently noticed that this element is counted on at times to cover lack of skill and team work. Ill effects are noted frequently, even in the well trained, from cumulative strain in endurance contests. This is not so true of exercises of speed and short duration where only momentary after effects show, such effects being nullified by proper care and restriction.

In the naval service statistics proving that athletes live long are not of as much importance as proof that this type of individual will continue to withstand the marked mental and physical strain of modern naval life, which can be expected to increase in time of peace as well as in time of war. The same man in civil life might be considered a good risk both from the average business and efficiency standard, but this does not always hold in the service where responsibility is never ending and on this point hinges statistical differences.

Some of the effects of over indulgence in athletics, commonly widely advertised as of benefit to the individual, are symptoms of acute exhaustion, breathlessness, rapid heart action, arrhythmia, cyanosis (dilatation of right heart), and collapse; later, loss of weight, nervous and mental exhaustion, lack of quickness of thought, loss of muscle elasticity, dull and listness eyes, unhealthy skin, and general fatigue, necessitating going on the sick list to recover from auto-intoxication due to the circulation of waste combustive products within the body. Still later effects have been noted in those of athletic history in the naval service, conditions applicable to athletic strain affecting future usefulness. Statistics proving favorable longevity in the case of athletes are based on those who, as the survival of the fittest handed their names down to posterity while, included in the nonathletic class, are the weak physiques and the near-athletes who failed to make the team, and these last are particularly more apt to demonstrate consequences, as experience shows that as a usual thing they failed because of lack of proper basic strength, many trying to emulate the strong, through lack of proper supervision, to their detriment.

Statistical comparison should be made between the athlete of robust physique and his nonathletic fellow of robust physique.

Realizing that from the standpoint of physique, and from observation, that conditions affecting physique of midshipmen were not perfect, a board of officers recently considered the subject and the following facts were discussed and recommendations made accordingly:

Prior to the Spanish war officers were graduated physically superior to those now graduated because the course then provided for the survival of the fittest, the weeding-out process beginning on en

trance examination and continuing throughout the course. Candidates physically deficient were rarely admitted to the Academy, while the pressure was such by reason of the fact that but 45 per cent of those entering graduated, that the physically weak who escaped the examining board, being unable to stand the pace, dropped out. Of the graduates, those at the head of each class in varying percentage only were commissioned, still further increasing the selection. At present about 3 per cent enter after rejection with gross physical defects, and 67½ per cent of those who enter graduate, most of the failures being due to professional causes. Many enter well below the weight and chest requirements, no other cause for rejection than general poor physique being applicable to this type. These last, if followed up, prove to be poor soil, and in going over the records of 1,800 midshipmen it was found that all those developing consumption in their future service came from this class (no midshipman above the physical requirements developing the disease), 85 per cent of those finally rejected physically (125 in the number mentioned) were under weight and chest requirements on entrance.

In the old course the summer practice cruises were of importance from the physical-training standpoint, owing to the constant making and furling of sail, pulling on ropes, and climbing of rigging in maneuvering ship on the sailing vessels used for instruction during the period. Such work in the open for more or less lengthy periods at sea was very beneficial, particularly in developing both muscular courage from going aloft and the muscles attached to the upper limbs and chest, which compensated for the excessive leg development no doubt produced then as now by the hourly daily marching to and fro for considerable distances in the aggregate, necessitated by recitations, drills, and climbing of stairways in quarters and other buildings. This physical development is now lost on the present cruises, most of the course being devoted to mental effort. The practical exercises in various departments on shore, as the theoretical studies have enlarged in scope, have also become mental and no longer retain the physical element.

To offset the loss noted little or nothing was done except to cultivate voluntary athletics, and this branch of physical training has evidently by itself alone failed to come up to expectations, principally because it reached only those as a rule for whom no concern should have been shown. In addition it is a fact that the services of officers have been lost to the Government through overindulgence in athletics, fostered by overzealousness in applying effort toward demonstrating the acme of power and skill without restriction.

In the Navy or Army no great advantage will accrue if a few individuals are capable of shining physically in certain lines of effort,

this being of questionable benefit when the great mass is neglected, so that the speed of the whole depends on the slowest.

To obviate the harmful effects of overathletic indulgence the following restrictions are in force: Restriction of boxing to class instruction, championship contest being barred; restriction of contests as to number and duration, with lengthened interval between; restriction to but two lines of effort in one year, to prevent constant training; supervision on the field of play by a medical officer who has authority independent of coaches to prevent a contestant from playing or to remove him from the game, this provision having reduced casualties and checked tendency to overwork; endurance contests like distant track and crew racing are considered harmful to midshipmen, contests of speed being favored as developing more headwork and but momentary rather than cumulative strain. The quarter-mile running race is now the limit in this line, while crew racing has still further been reduced in distance from 2 miles to $1\frac{7}{16}$ miles. More gymnasium developmental drill was recommended.

The strength test by muscle groups (49 in number) is used to separate the strong from the weak. Those who fail to pass receive 60 hours' gymnasium work additional to the 16 hours now assigned regularly to all individuals during the winter months. All gymnasium drills are compulsory, there being no substitutions permitted, nor is any individual excused. The effect of the strength test is to bar the weak from taking part in strenuous athletics, so that the work of the coaches and trainers is no longer wasted by having unwieldy squads to handle, composed for the most part of unfit material. The athletes are further checked as to fitness by a separate yearly medical examination, and by other examinations during the season. The weaker men have a strong incentive to perfect themselves by reason of the extra drill and the inability to shine at play.

To prevent slouching with consequent yielding in the spine, flat chest, and prominent abdomen (sway back), individuals are assigned extra drill for this defect even if well developed.

Swimming is a necessary accomplishment and failure to meet the requirements caused three of the first class of this year to fail to graduate with their fellows. An additional incentive toward showing an interest in this accomplishment is the extra drill periods assigned in recreation time, and the possibility of having to practice while more ambitious individuals are enjoying annual leave.

The restrictions noted have created a general interest in basic physical improvement, athletics being now secondary, which is the proper relation.

Gymnasium drills are no longer easy-going exercises or imitative in character, such methods having been discarded because of the poor results obtained and because of the ease with which shirking could

be practiced. A modified form of the Swedish system has been found to lend itself very well to the training of physique, and this system is now in force, so that all exercises are in the nature of military movements under strict discipline and command. The results have been excellent (see article in United States Naval Institute, June, 1912), and are certain to continue so because discipline can be enforced in the naval or military service.

The constant bombardment of consciousness by words of command followed by instant action is having an insidious influence in making the individual more responsive to strictly military orders, which is a desirable addition from the naval standpoint to good physique and muscular control.

Strong and weak are given a regular course of gymnasium work, because it has been found that the Swedish exercises prevent contractures of muscles, deficient range in joint movement, defects in posture, clumsy and sluggish response to various impulses of the will, and decreased coordination, all of which are apt to be present even in the strong.

In the general service conditions are similar to those applicable formerly to the midshipmen, and there is need for a method of compulsory exercise to overcome the present failure in results. The setting-up drill has failed to accomplish its purpose because of several faults: Sameness, no insistence on form, lack of exercises requiring muscle and nervous control (muscle courage), and lack of military command to prevent monkeylike imitation, and indifferent, perfunctory, noncohesive response.

The enlisted man often becomes well developed after enlistment as a result of the work he is required to perform. Much of this work is, however, heavy in type or automatic in character, there being no occasion to think of what is being done. The result is a ponderous, slouchy, negative strength, few of these individuals being able to use their muscles with any celerity or activity in movement.

There is need also for forms of exercise in the nature of feats, such as leaping or vaulting, not only to cultivate muscular judgment, but to momentarily increase the speed of the motor apparatus, heart, and lungs, to improve the endurance of the subject, which from his life at sea level is nearly always defective.

Consideration is now being given to the question of adopting a form of compulsory physical drill at all shore stations and on board ship, to apply to nearly all officers and men, which will provide for a daily work-out for all the muscles, provision being first made for a school of instruction, so as to obtain uniformity in method, and by a system of inspection prevent deterioration from lack of interest.

This system, if adopted, will probably be based on the Swedish method of physical training because of the command element, the

progression provided, and the type of apparatus called for, the last being of importance because most of it exists on board ship or can be easily improvised without calling for additional storage space.

THE PRESENT STATUS OF COLOR BLINDNESS.

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Color blindness, while commonly associated with the English chemist, Dalton, himself red-blind, had been described over 100 years previous to Dalton's account of his own case in 1794. Tuberville reported a case in 1684, while the case of a shoemaker by the name of Harris was exhaustively reported by Huddard in 1777. Until the time of the Swedish scientist, Holmgren, it had been considered a scientific curiosity and of but little practical import, though a great many points of interest had been discovered, its hereditary tendency, its greater frequency in males, and the fact that this defect would skip one generation and appear in the next.

Holmgren based his tests upon the theory of Young as modified by Helmholtz—that is, the Young-Helmholtz theory—and by his endeavors secured the adoption in Sweden of a test of color vision for railway employees. Since his time the possession of good color perception as a requisite for several trades and professions has become universal. That there has been a growing dissatisfaction with the original Holmgren test has been clearly patent, and among the most recent investigations of this subject is that held by the British departmental committee on sight tests for seamen, extending over a long period of time, and with a series of tests under the most diverse conditions, with a view to approximating natural conditions under which those engaged in seagoing and analogous occupations labor. The committee endeavored to determine to what degree theoretical results obtained in a limited space by a reduced scale represented those observed under natural conditions and to find the relationship between color perception and form vision.

To understand results more fully, it is necessary to review briefly the theories of color perception and the physics of light in so far as the latter pertains to colors.

A normal eye viewing a color spectrum made by passing a ray of solar light through a prism sees seven principal colors—red, orange, yellow, green, blue, indigo, and violet. The violet rays, being the most refrangible, are deflected nearest to the base of the prism, and these rays have the smallest wave lengths and the greatest number of vibrations per second. As the other end of the spectrum is approached the rays or colors become less refrangible, have greater wave lengths, and less rapid vibrations.

By spectroscopic analysis it can be shown that there are other rays at the two ends of the spectrum. Beyond the violet rays are found the ultraviolet or actinic rays, which are shorter in wave length than the violet and have a greater number of vibrations per second. Ordinarily these rays are not perceptible, but by shutting off the rest of the spectrum they become visible and are of a grayish-blue tint. At the opposite or red end of the spectrum are still other rays, the infra-red, which have a much greater wave length and a less number of vibrations than the red. These are the heat rays, and such of them as enter the eye are chiefly absorbed by the ocular media and probably make no impression on the retina. The spectral colors are pure or saturated; they are not capable of being broken up.

Spectral colors which by admixture produce white are termed complementary colors. For example, red and greenish blue, golden yellow and blue, green and violet, but this mixing of colors must be kept distinct from the mixture of pigments. The former forms a true addition, while the latter is a subtraction.

Mixing yellow and blue pigments produces a green instead of a white.

Different parts of the retina vary in their ability to perceive colors. In general, the periphery can perceive only light and shadow, or mixtures of white and gray; then comes an outer peripheral portion which perceives only blue and yellow, while the more central portion can, in addition, distinguish red and green. From this it has been deduced that the cones are more sensitive to light while the rods only respond under stronger stimulation. These views have been disputed by later investigators, notably Eldridge-Green.

Colors have certain properties—tint, saturation, and intensity or brightness; tint is taken from physics to mean the color proper, due to a definite refrangibility of the rays producing it, while saturation means their purity and freedom from admixture with white. This, of course, refers to spectral colors. In speaking of color sensations produced by pigments, the purity means the presence or absence of white mixed with the ground color, while the brightness depends upon the objective intensity of the light and the subjective sensitiveness of the retina.

Various theories have been advanced from time to time regarding color perception and color blindness. The one most noted and which probably has the greatest number of adherents is the Young theory as modified by Helmholtz, or as slightly diversified by other investigators. It must be admitted that each theory has had serious objections raised against it, and at the present time there is a strong tendency to hold the matter in abeyance.

Young in 1807 propounded the theory that there were in the retina three sets of color-perceiving elements, corresponding to the

three fundamental colors, red, green, and violet, and that homogenous light excites these three sets of fibers in varying degrees, according to the wave lengths, the red perceptive fibers being stimulated by light of the greatest wave length, the green perceptive fibers by light of medium wave length, and violet perceptive fibers by light of the smallest wave length. (Red, green, and violet are termed fundamental colors, because from these all possible colors can be constructed, though not in the saturation of the individual spectral colors.) But he also held that each color excites all fibers, though to a less degree, so that a simple red, while stimulating chiefly the red perceptive fibers, would also stimulate the green and violet, but the sensation would be red. In a like manner other spectral colors would, according to their wave length, stimulate the corresponding color-perceiving fibers, resulting in the different sensations of colors, while equally strong stimulation of all the fibers would give the sensation of white or whitish colors, and an absence of stimuli would result in black. There are several objections to this theory, chiefly from a physiological standpoint; it presupposes a specialization of nerve fiber; it does not account for the fact that the periphery of the retina is color blind, but perceives white or gray, and the explanation of the perception of black is rather poor.

Hering's theory, put forward several years later, holds that there are four colors which excite in us unmixed sensations, the others simply being combinations. These four colors are pure yellow, pure red, pure green, and pure blue. These are arranged in pairs as contrary colors, for under no circumstances can a combination of blue and yellow be imagined or of red and green, while, of course, the graduation between yellow and red, on the one hand, or yellow and green on the other can be imagined. There are presumed to be in the retina several sets of visual substances, the red-green, the blue-yellow, and the white-black. Light of certain wave length, the pure red, for instance, would break up the red-green substance and give the sensation of red, while waves of shorter wave length would cause an assimilation and give the sensation of green. This theory explains complementary colors in this way: If pure red and pure green, or pure yellow and pure blue, fell upon the retina at the same time and in equal proportion, there would be an equilibrium in their action on the visual substances for these colors, and the only result would be action of the two kinds of light on the white-black substance, so that a sensation of white of varying luminosity would result. This theory fills the requirements regarding the white-black sensations and complementary colors very well from a physiological standpoint, and perhaps explains the graduation of color-blindness cases better than the Young-Helmholtz theory.

A more recent theory based on biological evolution is that of Franklin, which presupposes an evolution from the primitive colorless vision, such as still exists in the periphery of the retina. There is presumed to be a visual substance in both rods and cones, but in the cones existing in a differentiated condition capable of giving color sensations. If the molecules of the visual substances are completely disassociated, the sensation of gray results, while in the nondeveloped gray present in the cones there can be partial disassociation of the molecule due to the difference in wave length of the light stimuli. This theory fits in very well with the lack of color sensation in the peripheral retina. It will be noted that to all these theories strong objections are apparent from an anatomical and physiological standpoint. Presumption has been made of specialization of nerve impulse such as has never been proven to exist. Scotomata can not be explained fully by these theories.

There have been several modifications of the Young-Helmholtz theory, usually in minor particulars. One proposed by Burch, and given by him in the appendix to the report of the departmental committe's sight tests, is simply, as he states, the original Young theory before its later modifications by Helmholtz. In brief, there are four distinct and independent color sensations—red, green, blue, and violet. White is produced by equal excitation of these sensations. Maxwell held that red, green, and blue were the fundamental colors, differing from the Helmholtz idea of violet.

One theory of color perception, namely, Peyers, is based upon the temperature sense. This theory holds that rays of light of certain wave length—for instance, the red—furnish warm colors, while those of extremely short wave length, as the violet, are cold colors. The spectrum is divided into a warm and cold half. Then he assumes optic nerve fibers to have two endings, one capable of being excited by the warm colored and one capable of being excited by the cold colored rays. Color blindness in this theory is a displacement or disturbance of this refined temperature sense, so that for instance in red-green blindness, the cones normally perceptive of warm rays—the red—are only yellow perceiving, while the cones normally perceptive of the cold rays only get the sensation of green. This theory seems a little vague and has not been widely accepted.

Eldridge-Green has evolved the following theory, in brief:

A ray of light impinging on the retina liberates the visual purple from the rods and a photograph is formed. (The rods are concerned only with the formation and distribution of the visual purple.) The ends of the cones are stimulated, through the photochemical decomposition of the visual purple, a visual impulse is set up which is conveyed through the optic nerve fibers to the brain. The character of the stimuli differs according to the wave length of the light causing it. In the impulse itself is the physiological basis of the sensation

of light, and in the quality of the impulse is the sensation of color. The impulse transmitted to the visual center produces the sensation of color. But though impulses vary in character according to wave length of light causing them, the retino-cerebral apparatus is not able to discriminate between the character of the adjacent stimuli, not being sufficiently developed. At the most, seven distinct colors are seen, while only six, five, four, three, or two may be perceived in proportion to development. This is the cause of color blindness; the person seeing only two or three instead of six puts colors together as alike, which are seen by the normal sighted to be different.

This theory, while open to objections, would seem to be an extremely plausible one with our present knowledge. In this the visual purple is the essential factor in both vision and color perception.

The varying sensibility of the fovea is very ingenously explained. The fovea contains no rods, merely cones, and if the cones are solely concerned, should see at all times extremely well and, of course, better than the other portions of the retina. The varying sensibility of the fovea is explained by the fact that containing no rods, hence no visual purple of its own, it takes an appreciable time for the visual purple to come from the surrounding retina. This accounts for the phenomena known to astronomers of having small stars disappear if gazed at directly, while if the eye is turned slightly the star will reappear. The visual purple has been used up and has not regenerated. This explanation of the phenomena of color vision is analogous to the theories of sound perception, a color-blind individual corresponding to the tone deaf, or those with poor musical ear, though the hearing may be considered good. Other theories differ but slightly in minor details from those gone into above, and so will not be taken up.

Certain requirements are necessary in a satisfactory test for defects of color perception. Nearly any test will catch the markedly color blind. Tests for form vision will throw out those with acquired defects of color vision, for there is usually a marked deterioration in the form perception. Under the present industrial conditions the colors necessary to be perceived are the very ones most often mistaken by the color blind or those with feeble chromatic sense; namely, red and green and the varying admixtures of white, since in maritime and railroad occupations these colors are used for signals. It has been suggested that the present signal lights be changed, but that is impracticable. Another factor rendering detection of color defects troublesome is the ability of the color blind to determine colors when the objects are near, or when they are large, while when removed to a greater distance they are entirely unable to make distinctions. The cases of central scotoma fall into this category.

According to Eldridge-Green a color test should exclude: First. Those who see three or less colors in the spectrum. Second. Those who, whilst being able to perceive a greater number of colors than

three, have the red end of the spectrum shortened to a degree incompatable with their recognition of a red light (signal) at a distance of 2 miles. Third. Those who are unable to distinguish between red, green, and white light at the normal distance through insensitiveness of the retinal nervous apparatus when the image on the retina is diminished in size. The rays on the extreme left—the red rays—are the most penetrating and are the ones by which a red light is recognized at a distance. This authority is very much in favor of having the candidate name the colors seen, arguing very reasonably that a ship's lookout, for instance, is not required to match the color seen, but to call it.

The color blind are classified by the above theory simply as monochromatic, if the spectrum is simply one color; as dichromatic if the extreme red and violet are distinguished and a broad neutral band exists between; or as trichromatic, tetrachromatic, and so on. According to Young-Helmholtz theory the color blind are divided into, (1) red blind, (2) green blind, (3) violet blind.

Those suffering from red blindness (typical cases) would have but two fundamental colors, green and violet. Red rays, or those of the wave length causing the sensation of red in the normal, must in the red blind produce a sensation, either of green or violet, or of both. The green being much nearer the red than the violet in wave length would, of course, be excited more, and the sensation would be a shade of green, while a faintly luminous red might not cause enough excitement to be perceived at all; hence such conditions in a light would result in its not being seen, while a woolen would appear dark, as a brown, for instance. An intense yellow to the red blind would seem a sort of green.

With the green blind there are then left two fundamental colors, red and violet. Red would excite the sensation of red, orange would appear as a variety of red, but less intense, yellow and green would appear pale or grayish or would excite, in some degrees of saturation, the same sensation as red, and if distinguished from red would be so done by certain differences in luminosity.

The condition known as violet blindness is extremely rare, but it follows the same lines—the fundamental colors are red and green. It will be seen that red blindness is really red-green blindness, and green blindness is really red-green blindness, while violet blindness is violet-yellow or blue-yellow blindness.

Hering calls the color blind red-green blind if they see only blue and yellow in the spectrum separated by a neutral space corresponding to the green. His theory explains the defect by assuming an absense of the red-green visual substance. He distinguishes two groups among these: First, those seeing the spectrum shortened at the red end (red blind by Helmholtz); second, those seeing the spectrum

unshortened (green blind by Helmholtz). Since the first have been found undersensitive to yellow, he terms them the "relatively blue-seeing type" of red-green blindness; and the second group, because they see a bluish red as gray, are termed the "relatively yellow-seeing type" of red-green blindness. The division of the red-green blind into these types is perhaps unnecessary for practical purposes. The blue-yellow blindness of Hering corresponds to the violet blindness of Helmholtz. If there were an absence of both the red-green and blue-yellow visual substances, only the white-black would be left, and all the colors would act merely as combinations of white-black, and hence would appear grayish. This is the Hering explanation of complete color blindness.

Probably the first classified and scientific test for the detection of color blindness was that of Seebeck, who used about 200 pieces of colored paper, having those undergoing examination sort out the similar colors. Maxwell in 1855 proposed a method of colored disks revolving in a top, which was arranged so that the various colors could be combined in any proportion.

Holmgren conceived the idea of preparing a test, based on the Young-Helmholtz theory, that utilized many of the practical points of the tests devised by Maxwell and Seebeck. This has produced the Holmgren method of testing with the worsteds, with which, doubtless, all are familiar. Modifications have been introduced from time to time; the skeins have been numbered to facilitate reports (Williams test set). In the case of Thompson, properly considered as a variety of this method, the skeins are attached by hooks to a stick and are numbered in such a way that the odd numbers denote match skeins and the even numbers confusion skeins.

Oliver's test is based on the Holmgren principle and makes use of worsteds. The previous board of trade tests used five test skeins to which the candidate compared the woolens, namely, (1) a light green, (2) a pink, (3) bright red, (4) a purple, and (5) a yellow. A small piece of the incorrectly selected woolen was in each case cut off of the skeins and stitched to a certain form and sent in by the examiner to the central office. This was necessary, since the examination was frequently made by other than medical men. Burch has a modification of the wool test and so has Eldridge-Green, though the latter claims his to be so far from the Holmgren that there is but little similarity except that the woolens are used.

The final report of the departmental committee regarding the woolens recommended that the deep-red skein (No. 3) be superseded by a deep brown. All the above and several other similar tests may be taken for practical purposes as modifications of Holmgren's, and the objections applicable to Holmgren's are in great measure valid as objections against the modifications.

Primarily these woolens are organic materials, subject to variations in coloring, are changed by exposure to light, and are soiled by handling. For the most part they are comparatively large objects, at the distance of examination they subtend a large angle, and for that reason central color defects are not recognized.

The color blind have been reported in several instances as being able to distinguish colors by refined sense of touch (in the dark browns and greens); it is well known that they can distinguish minute differences in luminosity; and, in case of using the comparison method, can sort colors fairly well. It does not exclude those with shortened spectrum at the red end, who are unable to determine signals at a distance. The use of small woolen pellets was added to the board of trade test because of the failure of the large skeins to detect cases of central color scotoma.

A more technical objection, but one of extreme practical importance, is that a man with the shortening of the spectrum for the violet, though not violet blind, would often fail on the woolens, although under practical conditions he would be extremely useful.

A sweeping criticism, and one well borne out, is that the worsteds in general (in an appreciable percentage of cases) allow those deficient in color sense to pass and reject those of good color vision. Also that the tests are not carried out under similar conditions of lighting or with similar rigidity; for example, if the examinee is allowed to compare colors many who are deficient will pass, while if every woolen handled is considered as a selection many who are noncolor blind will fail. As a test for men who are going to be subjected to rapid judging of colored lights and not comparisons of worsteds, it seems inadequate except as a corollary measure. Some of the objections raised against the tests by worsteds, due to the impossibility of obtaining constant definite colors and shades, apply to the next tests, those by colored objects other than worsteds.

The classification test of Eldridge-Green falls in this category. It consists of four test colors, orange, violet, red, and blue-green, labeled 1, 2, 3, and 4. Because of the tendency of the color blind to judge by luminosity and because of the greater ease with which they can judge by this means instead of by perception of color saturation when objects of the same nature are used, he makes use of 150 colored wools, 10 skeins of silk, 10 small squares of colored cardboard, and 10 small squares of colored glass. This is a complete test so far as material is concerned. The pocket test is somewhat similar to the above, consisting as it does of cards in which are threads of wool and 14 pieces of twisted silk. This method has an important value in the cases of central scotoma.

Nagel's test is of great value and has widespread acceptance in Germany. It consists of a series of little colored disks arranged in

rings, some of only one color in different shades and others of two or three colors (confusion colors). The one undergoing examination is required to pick out the rings of solely one color, and in the dichromatic or trichromatic rings to designate the disks of one special color. It is possible to determine whether or not color blindness is present and if so, the variety.

Another noted and extremely valuable test is that of Stilling. This is intended primarily to detect those among the color blind who, by means of their acute sense of change in luminosity and brightness, are able to pass a test like Holmgrens. In the preparation of this test Stilling was aided by a red-green blind painter and a blue-yellow blind teacher. He constructed a checkerboard-like arrangement with letters and figures of test colors arranged on a confusion color background. These are so shaded that to the color blind the test letter or design would not be perceived.

The various pellet tests have their chief use in the detection of central color scotoma. There are numerous minor changes in any test, due to the mental make-up of the examiner, but such differences are of degree only. The above tests are representative of the types of examination with worsteds and other materials. There is a marked difference of opinion as to whether or not the examiner should allow the one examined to closely compare colors, and whether or not the candidate should be asked names. It seems from a careful study of reports that the candidate should not be allowed to compare the skeins in the woolen tests, and it has been shown that a candidate can make selections matching a test color and not know the names of the color selected, even when this is not color ignorance but a feeble chromatic sense, the selection being made by similar luminosity.

Lantern tests.—It has long occurred to examiners that a test to be practical should partake of the character of the actual duty to be performed. A man whose duty it is to determine signals should be tested by lights simulating as far as possible his actual surroundings and conditions. The lanterns of Williams and Thompson are examples of the simpler varieties. Thompson's is perhaps the more complete, as attempts at confusion colors are made.

The lantern test presenting the greatest advantages with the fewest disadvantages thus far produced is that of Eldridge-Green. It is a circular flat lantern of very convenient shape containing four disks, three carrying seven colored glasses and one holding seven modifying glasses. The apertures are regulated to represent a 5½-inch railway signal light at 600, 800, and 1,000 yards when shown at a distance of 20 feet. The lighting is perhaps best done by means of electricity, though there are oil arrangements. The colored glasses are red (A and B), yellow, green, signal green, blue, and purple. The three disks

contain the same colored glasses, so that the light may be intensified or diminished and practically any combination produced. The modifying glasses are of ground glass, ribbed glass, and neutrals (Nos. 1, 2, 3, 4, and 5). The test should be made at a 20-foot distance, and while not essential it is perhaps better to allow the eye to become adapted to the dark; especially is this necessary with the smaller apertures. Rejections should be made if the candidate calls the red light, green, or the green light, red, under any circumstances. If a red of low luminosity is not seen it should be cause for rejection. If the white or green colors are not seen or if the green is called white the candidate should be rejected. The examiner can compare his own vision with that of the examinee as control. Owing to the fact that successive contrast is more marked in the color blind, a red can be shown, then followed by a yellow or clear. To the normal there is no change in the white or yellow, while certain color-blind individuals will call it red. In the same manner follow green by yellow, and it will appear as red to the trichromatic. This principle can also be carried out with success in the examination by worsteds.

The departmental committee, after consideration of various lantern tests, came to the conclusion that none thus far presented answered the requirements. According to the committee, such a lantern should conform to the following specifications:

(*a*) That it should be capable of showing one or two lights of small angular magnitude representing a ship's light at at least 1 mile.

(*b*) That it should be capable of being used by nonexpert examiners.

This last condition is open to criticism. It is extremely doubtful if any examination of a suspicious case should be left to nonexpert examiners. The interests involved are too great. The departmental committee had a lamp constructed on these lines: The lamp is fitted with 12 glasses, similar to glasses in practical use at sea, but adjusted so as to be of equal luminosity. There is an aperture of 0.2 inch, which under the condition of examination represents an average ship's light at 200 yards. Then two small apertures 0.02 inch in diameter separated 1 inch, representing a distance of 25 feet. The lamp is to be kept at the level of the candidate's eyes. The test is made in the dark, allowing at least 15 minutes for dark adaptation. The lights are reflected into a plain mirror 10 feet distant from the lamp. The examiner and the examinee stand by the lamp. The illumination is made by a paraffin lamp. This is the most frequent source of light. The lamp has four different greens, four reds and four whites. The simplicity of structure was designed to meet the demands of nonexpert examiners in using the colored glasses and modifying glasses. The accuracy of the tests has been seriously impaired in order to attain simplicity.

Spectroscopic tests.—The modification of the spectroscope, which permits a view of limited fields, is an absolute test. However, if an individual were scientifically educated and were shown the entire spectrum he could remember what he ought to see and of course could repeat the colors. There are several modifications, and Burch has a very elaborate one. The spectrometer of Eldridge-Green allows a very accurate examination and determination of wave length of the portion selected as monochromatic by one undergoing examination.

The polariscope can also be used in determining color blindness. The use of the polariscope and quantitative examination of the color sense will be of theoretical import only and will be able to find but little application in military services.

There has been found a relationship between form vision and color blindness. It would seem possible that a certain amount of chromatic aberration could enter into high errors of refraction. The eye is not a perfect optical instrument, though in a normal state it approximates perfection.

It was found by tests, in which those examined were not color blind but suffered from errors of refraction, that they could perceive the color of the light by the aid of binoculars while with the naked eye they made a large number of mistakes. It is evident that if a light is brought to the retina, not as a distinct and clearly outlined image but surrounded by diffusion circles, there will be much greater difficulty in perceiving the color.

The departmental committee in its report was of the opinion that a moderate hypermetropia of not more than 1.5 diopters would probably never cause trouble, and even if as high as 2.5 diopters it can be overcome by accommodation, so far as distant vision is concerned, up to 40 or 45 years of age. Hypermetropia of greater degree than this will soon interefere with good distant vision and with distant color perception, and those suffering from this trouble to such extent will be liable to break down early.

Myopia if of appreciable degree will be excluded by a requirement of normal vision. (In the board of trade requirements, normal one eye, half normal the other.) Owing to the tendency of myopia to become progressive those suffering from this condition are undesirable.

Acquired color blindness.—This is usually associated with marked deterioration in form vision. Very often this is in the form of central color scotoma as in tobacco amblyopia. These cases will fail on form vision; they may, however, pass a wool test or even other tests if the test objects subtend a large angle. It was found that those of poor form perception when tested by lights showed deficient color perception. Those lights at their maximum distance—3,000 yards (effective lens height 5 inches)—subtended an angle of 10 seconds,

and the distance between the lights (20 feet) at 3,000 yards subtended an angle of 7.7 minutes. A certain time with lantern tests is required to allow the eye to become dark adapted. The presbyopes, or those with marked errors of refraction, will be found to have poor vision in the state of dark adaptation, due to the dilatation of the pupil and the consequent diffusion circles.

The deduction from the luminosity measurements of the amount of color defect after the method of Sir W. Abney is extremely interesting, but has not been widely accepted. By a modification of his original method a small white screen is illuminated alternately and in rapid succession by white and by colored light. The intensity of the white light is altered until the illumination appears to be quite steady. If the brightness of illumination differs the light appears to flicker. When they are apparently steady, the observer is unable to tell whether white or colored light is shown and the luminosities are equal.

Tests for form vision and for color perception by lantern tests should be made preferably at 20 feet, or not less than 16 feet. Under the latter distance the accommodations come into play. One of the great advantages in the lantern test is the ability to convince the one examined and his friends that he is color deficient. Calling a red light green is something tangible, something that they can understand, while the wrong selection of a shade of woolen means little to them. The necessity for a strict maintenance of the requirements for form vision in the service is evident, and it is desirable from a standpoint of higher efficiency to add a supplementary lantern test.

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THE ORGANIZATION AND FINANCES OF THE BUREAU OF MEDICINE AND SURGERY.

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The organization of the bureau and its finances are so inseparably interwoven with the early history of the other branches of the service that any account given must begin years before the establish-

ment of the Bureau of Medicine and Surgery, and even of the Navy Department itself.

Bearing this in mind, it is a matter of interest to remember that the organization of the Navy was prior to the separation of the Colonies from the mother country, and antedated the Declaration of Independence.

On November 10, 1775, in the Colonial Congress, the following resolution was adopted:

That two battalions of marines be raised, consisting of one colonel, two lieutenant colonels, two majors, and other officers as usual in other regiments; that they consist of an equal number of privates with other battalions; that particular care be taken that no persons be appointed to offices or enlisted into said battalions but such as are good seamen or so acquainted with maritime affairs as to be able to serve to advantage by sea when required; that they be enlisted and commissioned to serve for and during the present war between Great Britain and the Colonies, unless dismissed by order of Congress; that they be distinguished by the names of the first and second battalions of American marines.

Fifteen days later (Nov. 25, 1775) another resolution provided—

That all such ships of war, frigates, sloops, cutters, and armed vessels as are or shall be employed in the present cruel and unjust war against the United Colonies, and shall fall into the hands of or be taken by the inhabitants thereof, be seized and forfeited to and for the purposes hereinafter mentioned.—(Organization of a navy.)

On December 13, 1775, the committee appointed to devise ways and means for fitting out a naval armament brought in its report, which, after debate, was agreed to as follows:

That five ships of 32 guns, five of 28 guns, three of 24 guns, making in the whole thirteen, can be fitted for the sea probably by the last of March next, viz: In New Hampshire one, in Massachusetts Bay two, in Connecticut one, in Rhode Island two, in New York two, in Pennsylvania four, and in Maryland one.

That the cost of these ships so fitted will not be more than 66,666-2/3 dollars each, on an average, allowing two complete suits of sails for each ship, equal in the whole to 866,666-2/3 dollars.

That the materials for fitting them may be all furnished in these colonies, except the articles of canvas and gunpowder, and that, therefore, it will be proper that Congress direct the most speedy and effectual means of importing the said articles of canvas and powder; that of the former, 7,500 pieces will be wanted, and that of the latter, one hundred tons.

Resolved, That a committee be appointed with full powers to carry the said report into execution with all possible expedition (except what relates to canvas and powder) at the expense of the United Colonies.

By resolutions dated December 22, 1775, and January 25, 1776, provision was made for issuing warrants and directing the operation of fleets as follows:

That the committee for fitting out armed vessels issue warrants to all officers employed in the fleet under the rank of third lieutenant.

That the said committee be directed (as a secret committee) to give such instructions to the commander of the fleet touching the operations of the ships under his command as shall appear to the said committee most conducive to the defence of the United Colonies and to the distress of the enemy's naval forces and vessels bringing supplies to their fleets and armies, and lay such instructions before the Congress when called for.

And—

That the direction of the fleet fitted out by order of Congress be left to the naval committee.

The cost of the earliest vessels of the Navy is thus seen to have been borne by the several colonies mentioned, except as to the very considerable items of canvas and powder, and their military control was directly under the Colonial Congress and through its naval committee, and it was not until by the act of August 7, 1789, and under our present form of government, that year established, that the Department of War was created, having to do, as its name implied, with both military branches, the Navy as well as the Army:

That there shall be an executive department, to be denominated the Department of War; and that there shall be a principal officer therein, to be called the Secretary for the Department of War, who shall perform and execute such duties as shall from time to time be enjoined on or entrusted to him by the President of the United States, agreeably to the Constitution, relative to military commissions, or to the land or naval forces, (b) ships, or warlike stores of the United States, or to such other matters respecting military or naval affairs as the President of the United States shall assign to the said department, or relative to the granting of lands to persons entitled thereto for military services rendered to the United States, or relative to Indian affairs. (c) And furthermore, that the said principal officer shall conduct the business of the said department in such manner as the President of the United States shall from time to time order or instruct.

During the period of nine years from 1789 until 1798 the executive control of the Navy was under the direction of the Secretary of War.

On April 30 of the last-mentioned year (1798) an act to establish the Department of the Navy was passed.

Sec. 1. That there shall be an executive department under the denomination of the Department of the Navy, the chief officer of which shall be called the Secretary of the Navy, whose duty (b) it shall be to execute such orders as he shall receive from the President of the United States relative to the procurement of naval stores and materials and the construction, armament, equipment, and employment of vessels of war, as well as all other matters connected with the Naval Establishment of the United States.

Sec. 5. That so much of an act, entitled "An act (c) to establish an executive department, to be denominated the Department of War," as vests any of the powers contemplated by the provisions of this act in the Secretary for the Department of War, shall be repealed from and after the period when the Secretary of the Navy shall enter on the duties of his office.

The department as thus established was but a single office and was not divided into bureaus.

On February 7, 1815, Congress authorized the President to appoint three officers of the Navy as a board of commissioners for the Navy, said board to be attached to the office of the Secretary of the Navy and to discharge under the Secretary's direction the ministerial duties of his office.

This organization of the department continued until 1842, except that by the act of May 13, 1832, two post captains were added to the board of commissioners, which was directed, by the same act and with the assistance of the Attorney General, to revise and enlarge the rules and regulations governing the naval service.

The separate existence of the Medical Department had its authority in the act of August 31, 1842, which reorganized the Navy Department, created five bureaus, and abolished the board of commissioners for the Navy.

Sec. 1. That the act (b) approved February seventh, eighteen hundred and fifteen, entitled "An act to alter and amend the several acts for establishing a Navy Department, by adding thereto a board of commissioners," be, and the same is hereby, repealed.

Sec. 2. That there shall be attached to the Navy Department the following bureaus, to wit:

1. A bureau of navy yards and docks.
2. A bureau of construction, equipment, and repair.
3. A bureau of provisions and clothing.
4. A bureau of ordnance and hydrography.
5. A bureau of medicine and surgery.

Sec. 3. That the President of the United States, by and with the advice and consent of the Senate, shall appoint, from the captains in the naval service, a chief for each of the bureaus of navy yards and docks, and of ordnance and hydrography, who shall each receive a salary of three thousand five hundred dollars per annum, in lieu of all other compensation whatever in the naval service; and shall in like manner appoint a chief of the bureau of construction, equipment, and repair, who shall be a skillful naval constructor; and shall also appoint a chief of the bureau of provisions and clothing, who shall each receive for his services three thousand dollars per annum; and shall in like manner appoint from the surgeons of the Navy a chief of the bureau of medicine and surgery, who shall receive for his services two thousand five hundred dollars per annum.

Sec. 5. That the Secretary of the Navy shall assign and distribute among the said bureaus such of the duties of the Navy Department as he shall judge to be expedient and proper; and all the duties of the said bureaus shall be performed under the authority of the Secretary of the Navy, and their orders shall be considered as emanating from him, and shall have full force and effect as such.

Sec. 7. That the chief of each bureau hereby established shall be authorized to frank all communications from his bureau; and all communications to his bureau on the business thereof shall be free of postage.

Sec. 8. That the books, records, and papers now belonging to the office of the Navy commissioners shall be distributed among the bureaus according to the nature of their duties, respectively; and the Secretary of the Navy is hereby authorized to provide for each bureau such books of record and accounts

and such stationery as may be found necessary, for which purpose the sum of three thousand five hundred dollars is hereby appropriated, payable out of any moneys in the Treasury not otherwise appropriated.

The history of the Medical Department of the Navy from April, 1775, to August, 1842, is in the history of the Navy, and may not be readily enough separated for the purposes of this paper. Since the creation of the bureau in 1842, however, it has had a more distinct separate existence, and so abundant material is available that only such principal facts are used here as best suit the purpose of this article.

Prior to the passage of the act approved August 26, 1842, the fiscal year of government was coincident with the calendar year. The terms of the act provided that the new and succeeding fiscal years should begin on July 1 and end June 30, and that the first fiscal year should be July 1, 1843, to June 30, 1844.

For the more convenient remittance of funds to pay officers, and to secure accuracy in the accounting of Navy finances, the Congress by the act of June 19, 1878, created the "General account of advances."

That the Secretary of the Navy be, and he hereby is, authorized to issue his requisitions for advances to disbursing officers and agents of the Navy under "General account of advances," not to exceed the total appropriation for the Navy, the amount so advanced to be exclusively used to pay current obligations upon proper vouchers, and that "Pay of the Navy" shall hereafter be used only for its legitimate purpose, as provided by law.

That the amount so advanced be charged to the proper appropriations, and returned to "General account of advances" by pay and counter warrant; the said charge, however, to particular appropriations shall be limited to the amount appropriated to each.

That the fourth auditor shall declare the sums due from the several special appropriations upon complete vouchers, as heretofore, according to law; and he shall adjust the said liabilities with the "General account of advances."

This is an account, not a fund, and its total can not exceed the total of the appropriations made for general Navy purposes (current obligations) in any one year. All requisitions covering advances of funds to pay officers are drawn against it for the payments for services and for the purchase of supplies. When the accounts of pay officers are rendered to the auditor the amounts so advanced are adjusted in the office of the auditor, who debits the amounts so advanced to the proper appropriations, and credits in like amounts the "General account of advances."

Prior to the fiscal year 1844 lump-sum appropriations prevailed, subject to allotment by the Secretary among the various service activities. With the organization of the bureau, however, and since, appropriations have quite uniformly been made under bureau caption. The following table is given in illustration of the growth of demands made upon the Medical Department of the Navy, begin-

ning with the year after the organization of the bureau, and thereafter by decades until 1910:

1844		$48,840.00
1850		38,500.00
1860		35,600.00
1870		80,000.00
1880		130,000.00
1890		102,500.00
1900		125,000.00
1910. Medical Department	$370,277.74	
Contingent	69,700.00	
Repairs	45,000.00	
Bringing home remains	13,000.00	
		497,977.74
1911. Medical Department	382,442.32	
Contingent	76,500.00	
Bringing home remains	15,000.00	
		473,942.32
1912. Medical Department	460,000.00	
Contingent	79,000.00	
Bringing home remains	13,000.00	
		552,000.00
1913. Medical Department	430,000.00	
Contingent	97,000.00	
Bringing home remains	15,000.00	
		542,000.00

The appropriations at different periods have varied in purpose, in scope, and in their titles; i. e., that now known as "Medical Department" was formerly "Surgeons' necessaries," and was merged with "Civil establishment" at the time of change in title.

Annual appropriations are for the expenses incurred during the fiscal year for which made, and unexpended available balances may not be used after the expiration of the year except in the settlement of accounts pertaining to the year and during the two years following.

A comprehensive idea can not be obtained of any law or of an appropriation unless the act is considered in its entirety and at one time; for this purpose the full phraseology of the several bureau appropriations, taken from the naval act of August 22, 1912, follows:

Medical Department, 1913.—For surgeons' necessaries for vessels in commission, navy yards, naval stations, Marine Corps; and for the civil establishment at the several naval hospitals, navy yards, naval medical supply depots, Naval Medical School, Washington, and Naval Academy, four hundred and thirty thousand dollars.

This appropriation divides naturally into two parts, due to the fact that the former-time appropriations, "Surgeons' necessaries" and "Civil establishment" were combined under this title.

(*a*) It pays for all medical supplies for ships, navy yards and stations, including the Marine Corps, and for such as are issued to hospitals from naval medical supply depots.

(*b*) It pays the rolls of civilian employees at hospitals, navy yards, stations, and naval medical supply depots.

Contingent, M. and S., 1913.—For tolls and ferriages; care, transportation, and burial of the dead; purchase of books and stationery, binding of medical records, unbound books, and pamphlets; hygienic and sanitary investigation and illustration; sanitary and hygienic instruction; purchase and repairs of wagons, automobile ambulances, and harness; purchase of and feed for horses and cows; trees, plants, garden tools, and seeds; incidental articles for the Naval Medical School and naval dispensary, Washington; rent of rooms for naval dispensary, Washington, District of Columbia, not to exceed one thousand two hundred dollars; naval medical supply depots, sick quarters at Naval Academy and marine barracks; washing for medical department at Naval Medical School and naval dispensary, Washington; naval medical supply depots, sick quarters at Naval Academy and marine barracks, dispensaries at navy yards and naval stations and ships; and for minor repairs on buildings and grounds of the United States Naval Medical School and naval medical supply depots; for the care, maintenance, and treatment of the insane of the Navy and Marine Corps on the Pacific coast; for dental outfits and dental material, not to exceed fifteen thousand dollars, and all other necessary contingent expenses; in all, ninety-seven thousand dollars.

In addition to the contingent quality given by the last sentence of the above, this appropriation is also specific in character, embracing quite the entire field of the bureau's activities not covered by other appropriations, and in some particulars, as in transportation of dead, overlapping in a measure features provided for elsewhere.

Included in the "other necessary contingent expenses" are the miscellaneous claims constantly arising for reimbursement of officers and men for expenses incurred for medical and surgical care while on detached duty, the more important of which are those made under the authority of section 1586 of the Revised Statutes and article 1131 of the Navy Regulations.

Bringing home remains of officers, etc., Navy Department.—To enable the Secretary of the Navy, in his discretion, to cause to be transferred to their homes the remains of officers and enlisted men of the Navy and Marine Corps who die or are killed in action ashore or afloat, and also to enable the Secretary of the Navy, in his discretion, to cause to be transported to their homes the remains of civilian employees who die outside of the continental limits of the United States, fifteen thousand dollars: *Provided*, That the sum herein appropriated shall be available for payment for transportation of the remains of officers and men who have died while on duty at any time since April twenty-first, eighteen hundred and ninety-eight.

This appropriation, though made annually, differs from "Medical Department" and "Contingent" in that it belongs to a class known as "no year" appropriations, and by its terms is available for past

and future obligations. Each new appropriation is added to the balance on hand of the preceding fiscal year.

As shown by its phraseology, it in a measure covers items of expense already provided for under "Contingent," but this duplication of purpose is more apparent than real. It is intended primarily for the transportation of the dead, and is a beneficent act, in that its sole purpose is to afford a measure of relief and of consolation to the bereaved families, and is not to advance directly the interests of the Navy. It may properly be used for all the expenses incident to as well as for the actual transportation; hence it includes embalming and other necessary preparation, and incasement of the remains, but it may not be used for interment. It may also be used for the transportation of the remains of officers within the United States, whereas "Contingent" may not be so used by the prohibition of section 1587 of the Revised Statutes.

THE NAVAL HOSPITAL FUND.

This is not an appropriation made by Congress, and the moneys held under this title, and the property and investments, including buildings and grounds purchased or otherwise acquired, constitute a trust fund of which the Secretary of the Navy is now the sole trustee. The moneys are deposited in the United States Treasury, and expenditures are safeguarded by the same laws, regulations, and procedures as govern the expenditures of appropriations that do belong to the United States Government.

In 1798 Congress made provision in the establishment of the Marine Hospital Fund for the care of sick and disabled seamen of the merchant marine. The law, which became effective on September 1 of that year, required that the master or owner of every ship of the United States arriving from a foreign port should render to the collector of the port a true account of the number of seamen employed and should retain from the wages of such seamen 20 cents per month, to be paid to the collector. These moneys were used by the President to provide for the temporary relief and maintenance of the sick and disabled seamen of the merchant marine in civil hospitals and other institutions in the several ports.

By the act approved March 2, 1799, entitled "An act in addition to 'An act for the relief of sick and disabled seamen,'" the Secretary of the Navy was authorized and directed to deduct, after September 1, 1799, from the pay of every officer, seaman, and marine at the rate of 20 cents per month, and to pay the same quarter annually into the Treasury, to be applied to the same purposes as the money retained from the wages of the seamen of the merchant marine.

Until 1811 this joint fund was used for the relief of the sick of the merchant marine and of the Navy and Marine Corps, but un-

avoidable inconveniences and embarrassments arose through the treatment in civil hospitals of naval patients subject to military law and control. Congress was urged to provide by law for the care of naval patients in separate institutions, and on February 26, 1811, the joint fund was separated into two funds, one to be known as the "Marine Hospital Fund," continued for the benefit of the seamen of the merchant marine, and the other as the "Naval Hospital Fund." This was accomplished by the law known as "An act establishing Navy hospitals," as follows:

SEC. 1. That the money hereafter collected by virtue of the act entitled "An act in addition to 'An act for the relief of sick and disabled seamen,'" shall be paid to the Secretary of the Navy, the Secretary of the Treasury, and the Secretary of War for the time being, who are hereby appointed a board of commissioners, by the name and style of commissioners of Navy hospitals, which together with the sum of fifty thousand dollars, hereby appropriated out of the unexpended balance of the Marine Hospital Fund, to be paid to the commissioners aforesaid, shall constitute a fund for Navy hospitals.

SEC. 2. That all fines imposed on Navy officers, seamen, and marines shall be paid to the commissioners of Navy hospitals.

SEC. 3. That the commissioners of Navy hospitals be, and they are hereby, authorized and required to procure, at a suitable place or places, proper sites for Navy hospitals, and if the necessary buildings are not procured with the site, to cause such to be erected, having due regard to economy, and giving preference to such plans as, with most convenience and least cost, will admit of subsequent additions, as the funds will permit and circumstances require; and the commissioners are required, at one of the establishments, to provide a permanent asylum for disabled and decrepit Navy officers, seamen, and marines.

SEC. 4. That the Secretary of the Navy be authorized and required to prepare the necessary rules and regulations for the government of the institution, and report the same to the next session of Congress.

SEC. 5. That when any Navy officer, seaman, or marine shall be admitted into a Navy hospital the institution shall be allowed one ration per day during his continuance therein, to be deducted from the account of the United States with such officer, seaman, or marine; and in like manner, when any officer, seaman, or marine, entitled to a pension, shall be admitted into a Navy hospital, such pension, during his continuance therein, shall be paid to the commissioners of the Navy hospitals and deducted from the account of such pensioner.

Approved, February 26, 1811.

Between February 26, 1811, and July 10, 1832, the business of the Naval Hospital Fund was administered by the commissioners of Navy hospitals. By section 5 of an act of the latter date for the regulation of the Navy and privateer pension and Navy hospital funds all the powers and duties imposed by law on the commissioners were transferred to the Secretary of the Navy, who became then and still remains the sole trustee of the fund.

The act of June 19, 1878, in establishing the general account of advances, prohibited the use of "Pay of the Navy" for any other than its legitimate purposes provided by law, and in so doing recognized the fact that advances had been made from that appropriation

for purposes not contemplated by law. This misuse of "Pay of the Navy" brought about deficiencies in that appropriation, to tide over which sums of money aggregating $150,000 were at times during the years 1811 to 1832 taken from the Naval Hospital Fund and which have never, so far as the author has been able to ascertain, been repaid, although the matter was several times reported to Congress by the commissioners.

The several sources of revenue of the fund are (*a*) 20 cents per month "hospital tax" deducted from the pay of each officer, seaman, and marine, including members of the Navy Nurse Corps and Naval Auxiliary Service (sec. 4808, R. S.); (*b*) the value of one ration (30 cents) per day during the period that each patient remains in hospital (sec. 4812, R. S.); (*c*) the pensions of naval patients and supernumeraries while under treatment in hospitals (sec. 4813, R. S.); (*d*) all fines imposed by sentence of courts-martial (sec. 4809, R. S.); (*e*) all forfeitures on account of desertions (act approved June 7, 1900); (*f*) proceeds of sales of hospital property; (*g*) payments made by navy-yard employees for subsistence under authority of General Order No. 148, dated January 10, 1912, and Supplies and Accounts Memoranda for the Information of Officers, etc., No. 131, dated February 1, 1912.

The objects for which expenditures may be made comprehend the purchase of hospital sites, the erection of hospital buildings, and all expenses of maintenance and upkeep, including provisions and other supplies, equipment, furniture, fuel, light, minor and major repairs, extension of buildings, building of roadways, wharves, fences, and for the support of patients in civil hospitals at home and abroad. Every expense for the proper establishment and maintenance of a naval hospital may be paid from the Naval Hospital Fund, except as Congress may assume to provide for certain expenses by specific appropriation, as, for instance, under "Medical Department" for the pay of civil employees and under "Contingent" for the "purchase of and feed for horses and cows," and the purchase of "automobile ambulances." Specific provision in an appropriation act stops the use of the Naval Hospital Fund for the same purpose, so that an ambulance that could be purchased from the fund if not provided in the appropriation can not be so purchased so long as provision is made by appropriation.

The appropriations for the Navy are placed for their expenditure under the cognizance of the several bureaus to which they pertain, and the accounts of expenditures are usually maintained under the title of the appropriation. It is not, therefore, practicable at all times to determine the exact cost of certain activities, as, for instance, the total cost of the maintenance of a naval hospital.

The statement of expenses of maintenance of naval hospitals, reported by this bureau, it is well understood by those familiar with Government accounting, are only the expenses of those particular institutions defrayed from moneys under the cognizance of this bureau, but such a statement might be misleading to persons not familiar with the above-mentioned conditions. A complete and full statement, if made, would also include expenditures in a considerable sum for the pay of the officers, Hospital Corps, and Nurse Corps, commutation of quarters, allowances, mileage and other travel expenses, freight, telegrams, telephone rentals, etc., all charges against appropriations not under this bureau's cognizance.

REQUISITIONS AND VOUCHERS.

The law requires that purchases of supplies or services, except personal service, shall be by advertising in the newspapers or by circular and poster for proposals, except for medicines and certain other articles exempted (sec. 3721, R. S.), when the aggregate of the amount required exceeds $500. Purchases not aggregating $500, and for the naval service, may be made in the open market in the manner common among business men, without contract or bond, but must be so arranged by design to evade purchases under formal contract or bond.

The first step in the procurement of material or service is the preparation of a requisition. For convenience blank forms are used that indicate the information required concerning the necessity and character of and quantity and estimated cost of the supplies to be purchased. Each requisition is accompanied by so many memorandum copies (at present four) as may be required. The requisitions are numbered in series for each fiscal year. The estimated cost of each item and the total is entered upon the memorandum copies only. The original only bears signatures and, except in the case of formal contracts, accompanies the original of the public bill, and finally lodges with the accounting officer (Auditor) of the Treasury. One memorandum copy each remains in the Bureau of Medicine and Surgery, two in the Bureau of Supplies and Accounts, and one in the office of the purchasing pay officer.

Requisitions must give such accurate information as will enable the purchasing pay officers and the bidders to readily understand what is required, and items must be arranged so that articles of a similar nature may be grouped. Articles or services coming under different appropriations may not be combined on one requisition. Proprietary articles must not be called for when it can be possibly avoided, but when called for it must be certified by the officer making the requisition that "the article and no other will answer the neces-

sities of the service." All articles on a requisition may not be procured from one dealer, in which case two or more public bills may be necessary in connection with but one requisition; in such instances the original of the requisition accompanies the first public bill made, and notation is appropriately made on subsequent public bills of its disposition. Stores carried in stock for issue at navy yards by the general storekeeper can be drawn by heads of departments on stub requisition without approval of the bureau.

Requisitions on the naval medical supply depots are made on blank forms specially prepared for the purpose and, having full instructions printed thereon, require no explanation here. They are numbered in the same series for each fiscal year, which has been before mentioned.

Public bills are prepared on blank forms furnished for the purpose, which blank forms have been previously submitted to the Comptroller of the Treasury, whose approval of same as to completeness is required by law before they may be used. An original and a sufficient number of memorandum copies are required. The original, accompanied by the original of the requisition, finally lodges with the auditor. One memorandum copy remains in the Bureau of Medicine and Surgery, two in the Bureau of Supplies and Accounts, one with the pay officer who makes the payment, one with the accounting officer of the yard, and one stamped "Dealer's copy" accompanies the check to the payee as an identification of the payment. The office in which the requisition and public bill originate, of course, retains copies of each, which are recorded in the bill book. Signatures are only affixed upon the original copy of a public bill. The memorandum copies are true copies, except that the places for signatures are filled by stamping or typing therein the names.

Medical officers are responsible for the correctness of the certificate of inspection and acceptance, and the purchasing pay officers for the correctness of the certificate as to method of purchase and as to prices. It is expected of both to exercise special care not only as to accuracy in figures, but that the appropriation involved shall be correctly stated in title and fiscal year.

The requisition and voucher forms have been carefully prepared to meet every legal requirement, and it is forbidden that the phraseology of the forms should be altered when either supplies or services are furnished or performed.

THE MEDICAL CORPS.

The Navy of the United Colonies was established during the latter part of 1775 by the organization of two battalions of marines, and by the fitting out of 13 ships at the expense of the separate colonies. While each of these ships was officered and manned by the colony bearing the expense of the outfitting, yet the officers received their

commissions and warrants from the Committee for Fitting Out Armed Vessels of the Congress of the United Colonies. In addition to the foregoing the fitting out of private ships of war was authorized by the acts of March 23 and April 2, 1776. Each vessel, according to the custom of the times, carried at least one surgeon, who received his warrant or commission from the Congress of the United Colonies. Surgeons usually held commissions, while surgeons' mates received warrants. Except in the light of their achievements, it is difficult for us at this time to understand that so varied an assortment of personnel and equipment could be welded together for coordinate activity.

The medical officers of the different vessels do not appear during this early period to have borne any close relationship one to another, and were without well-defined rank, although they were by the act of July 16, 1777, given the pay and subsistence of the lieutenants of the vessels on which they served.

At the time of the first trouble with Algeria, in 1794, the United States was without available and proper vessels of war, and officers and men. On account of the depredations then committed by the Algerian corsairs in our commerce. Congress found it necessary, by the act of March 27, 1794, to provide a naval force of 4 ships, 2 of 44 guns and 2 of 36 guns. This was the first rehabilitation of the Navy.

Systematic organization was first attempted by the act approved March 2, 1799, to regulate the medical establishment, as follows:

SEC. 1. That in the medical establishment of the United States there shall be the following officers: A physician general, who shall be charged with the superintendence and direction of all military hospitals, and generally of all medical and chirurgical practice or service concerning the Army or Navy of the United States, and of all persons who shall be employed in and about the same, in camps, garrisons, and hospitals. An apothecary general, and one or more deputies, who shall be charged with the safe-keeping and delivery of all medicines, instruments, dressings, and other articles for the use of the hospital and Army. A purveyor, who shall be charged with providing medicines, stores, and whatsoever else may be necessary in relation to the said practice or service. A competent number of hospital surgeons, who shall be liable to serve in the field, and who shall have the immediate charge and direction of such military hospitals as may be committed to their care respectively. A suitable number of hospital mates, who are to observe the directions of the hospital surgeons, and shall diligently perform all reasonable duties required of them for the recovery of the sick and wounded.

It was not until by the act of May 24, 1828, that any systematic or well-defined procedure appears to have been adopted regulating the examination, admission, and appointment of assistant surgeons. The same act provided for the designation by the President of an experienced and intelligent surgeon in the naval service to be denominated "Surgeons of the fleet," who, in addition to his compensation as surgeon, was allowed a double ration.

Section 1586, Revised Statutes, provides that "Expenses incurred by any officer of the Navy for medicines and medical attendance shall not be allowed unless they were incurred when he was on duty, and the medicines could not have been obtained from naval supplies, or the attendance of a naval medical officer could not have been had." The primary requisite to secure reimbursement under this law is the proof of a "duty status" at the time the expenses were incurred. The intent of the law is that officers of the Navy and Marine Corps shall not suffer a hardship when placed on duty by competent authority where naval medical aid and naval medical stores are not available. When an officer of his own volition or for his own pleasure or convenience places himself beyond the reach of naval medical aid, reimbursement can not be made for any expenses incurred for the employment of a civilian physician.

In like manner claims for expenses incident to oculist's service for the determination of refraction with a view to the adjustment of glasses, and for dental services for the restoration of defective teeth, may not be allowed either enlisted men or officers when the services are secured to correct physiological conditions due to natural causes, as of advancing age. But such expenses may be borne by the Government when incurred with competent authority to correct an injury incurred in an act of duty.

THE BUREAU.

The present outline of the organization of the bureau is principally as follows, the minor details not being given:

1. The Surgeon General, chief of bureau and its administrative head.
    1. The assistant to bureau, who acts as executive, coordinating the entire organization and work of the bureau, under the supervision of the Surgeon General, and acts as chief of bureau in the temporary absence of the Surgeon General.
        1. Division A (Clerical and Financial). Chief clerk in charge.
            - Subdivision 1.
                - (a) Finance.
                - (b) Correspondence.
                - (c) Clerical force.
                - (d) Files.
            - Subdivision 2. Pharmacist in charge.
                - (a) Supplies.
                - (b) Requisitions.
                - (c) Public bills.
        2. Division B (Personnel). Medical officer in charge.
            - Subdivision 1.
                - (a) Medical Corps.
                - (b) Medical Reserve Corps.
                - (c) Dental Corps.
                - (d) Red Cross.

1. The Sugeon General, chief of bureau and its administrative head—Contd.
   1. The assistant to bureau, who acts as executive, etc.—Continued.
      2. Division B (Personnel). Medical officer in charge—Continued.
         Subdivision 2. Medical officer in charge.
            Hospital Corps.
         Subdivision 3. Superintendent, Nurse Corps, in charge.
            Nurse Corps.
      3. Division C (Records and Pensions). Medical officer in charge.
         Subdivision 1.
            (a) Physical qualifications of candidates for enlistment, appointment, promotion.
            (b) Medical surveys.
            (c) Health records.
         Subdivision 2. Pharmacist in charge.
            (a) Pensions.
            (b) Records for promotion and retirement.
            (c) Vital statistics.
      4. Division D. Medical officer in charge.
            (a) Construction.
            (b) Sanitary features, ships and stations.
            (c) Legislation.
      5. Division E (Publications). Medical officer in charge.
            (a) Report of the Surgeon General.
            (b) Naval Medical Bulletin.
            (c) Miscellaneous.

The bureau has control of hospitals and of the force employed, and general direction of the internal organization and administration of hospital ships; it has advisory power on all questions of hygiene and sanitation, and opportunity for unobstructed inspection; it provides for all physical examinations, and passes upon the competency of men in the Hospital Corps for enlistment and promotion; it has power to appoint and remove members of the Nurse Corps; its duties comprise all that relates to naval medical supply depots, hospitals, hospital ships, dispensaries, and technical schools for the Medical, Hospital, and Nurse Corps; it approves the designs of buildings erected for its use, and under the special direction of the Secretary the purchase, transfer, and sale of land and buildings, and is charged with the preservation of its property.

THE UNITED STATES NAVAL HOSPITAL, LAS ANIMAS, COLO., THE NAVY'S SANATORIUM FOR TUBERCULOSIS.

By PHILIP LEACH, Medical Director, United States Navy.

One of the purposes of this paper is to question the advisability of extending beyond its present capacity, at the expense of the naval hospital fund and the naval appropriations, an institution that does not, like the general hospitals, contribute to the upkeep of the Navy's

personnel. With this object in view there follows a brief description of the institution, reference to the difficulties in the way of economical and efficient administration, and some consideration of its function in the disposal of the Navy's tubercular subjects.

DESCRIPTION.

The hospital occupies the site of the abandoned military post known as New Fort Lyon, which is situated on the Colorado Plateau, about 3,800 feet above sea level, in the midst of the desolate, arid region that was formerly known as the Great American Desert, and which, notwithstanding the reclamation of much land by irrigation, is still entitled to that name. The reservation, comprising about 600 acres, lies on a plain on the north bank of the Arkansas River about 7 miles from Las Animas, the nearest town. A number of the old Army buildings have been rebuilt or remodeled to suit the requirements of a tuberculosis sanatorium and hospital, and many new buildings, admirably designed for their specific purpose, have been erected. Ornamental and shade trees have been planted, alfalfa fields, pastures, lawns, and orchards established, a large vegetable garden placed in successful operation, roads and walks built, and a copious water supply developed. The general aspect of the place is that of a prosperous, well-planned village. The various buildings, including the dwellings for the staff and the executive buildings, number 85. There are 5½ miles of wire fence, 4 miles of graded roads, 2½ miles of concrete walks, over 1 mile of cinder walks, and 1¼ miles of concrete curbing. A sewer system having 2½ miles of tile pipe is connected with nearly all of the buildings. Two waterworks high-pressure pumping stations, over a mile apart, and a million-gallon concrete reservoir are devoted to irrigation, fire protection, and flushing. The hospital also has a right in the Fort Lyon Canal Co., the water being brought to the reservation through a 10-inch tile pipe as an adjunct in surface irrigation. The domestic water supply is derived from 6 artesian wells having a total capacity of about 60 gallons per minute, and is stored in a concrete reservoir of 250,000 gallons capacity and in a 72-foot steel water tower of 100,000 gallons capacity. Distribution from these two systems is by 5 miles of iron water mains and 4 miles of vitrified tile pipe. There is a local telephone system having 5½ miles of exterior wiring and 1½ miles of interior wiring for 54 stations, with long-distance connection. The electric system comprises 4 generators of 140 kilowatts total capacity, 3 arc lights, 1,800 incandescent lamps for buildings and streets, 15 motors of from ½ to 60 horsepower, and 10¾ miles of exterior and 1½ miles of interior wiring. An extensive hot-water heating system, having about 4 miles of mains in concrete conduits, serves practically the entire institution. In the central power plant, which has a

capacity of 400-boiler horsepower, are situated ice-making and refrigerating machinery with cold-storage rooms, pumping machinery for the artesian system, and a shop equipped with motor-driven machine tools.

A well-lighted, warmed, and ventilated prison containing 5 cells, a water-closet and shower bath, and a locker for the effects of each prisoner, contributes to the discipline of the station.

An isolated mortuary, well equipped with apparatus and suitable plumbing, serves a useful purpose in an institution where the mortality is necessarily high.

Disinfection of clothing, bedding, etc., is accomplished by means of a large jacketed steam chamber and by a small one having a formaldehyde attachment. These chambers are installed in a stone building constructed for the purpose, the receiving room being separated from the delivering room by an air-tight partition. A door of the laundry is within a few feet of the door of the latter room. The laundry is in a special building. Its equipment consists of steam appliances and modern motor-driven machinery.

Kitchen refuse is disposed of by arrangement with a neighboring farmer, who utilizes it as food for hogs. It is boiled before being so used. All other garbage is destroyed by an incinerator, occupying a stone house on the river bank at a suitable distance from the other buildings. Two stone and fire brick incinerators, situated at a convenient distance from the patients' quarters, provide for the sanitary disposal of sputum.

A recreation building, containing a theater, moving-picture apparatus, billiard room, reading room, library, barber shop, and canteen; a building containing a shuffleboard and excellent bowling alleys; an athletic field and tennis courts and croquet grounds furnish salutary exercise and amusement for patients and the hospital staff.

The arrangement of the patients' quarters is based upon a division of the patients into two classes, officers and enlisted men, and each class is subdivided and housed in accordance with physical distinctions.

For officer patients there are eight 4-room cottages for ambulant cases, a subsistence building, and an infirmary or hospital having 6 rooms. The subsistence building and the infirmary are conveniently connected by means of a long corridor that also serves the purpose of a solarium. Each room in the cottages and the infirmary has a spacious lounging and sleeping veranda.

For enlisted men there are five buildings for ambulant cases, having a nominal total capacity of 154 beds and an infirmary of 50 beds. To avoid overcrowding among the ambulant cases the capacity of the five buildings referred to should be regarded as not over 124. The infirmary is a complete hospital, having a general operating room,

nose and throat room, subsistence building, special-diet kitchen, and other administrative features. Occupants of the wards for ambulant cases and the infected employees are subsisted in a building conveniently placed for the purpose.

A special subsistence building is devoted to the hospital corps, the marine guard, and the noninfected employees, and a well-equipped modern bakery, separated from the other buildings, serves the entire institution.

Each of the four subsistence buildings is equipped with the steam apparatus and other labor-saving devices found in the culinary department of modern first-class hotels.

All of the hospital buildings are cheerful, well warmed, ventilated, and lighted, and fitted with adequate tub and shower baths, lavatories, and water-closets.

All wards and nearly all dwellings for the staff have large well-screened verandas that encourage living in the open air.

As yet the hospital has neither a dairy nor a poultry farm, but these are adjuncts that doubtless will be established in time when circumstances are propitious. At present the supply of milk and cream is derived from a neighboring dairy that was developed by private enterprise to meet the needs of the hospital, and poultry and eggs are obtained from dealers.

The cost of the hospital plant described above for construction and for fixed and portable equipment that is not expendable has, at the present time, reached the sum of about $750,000.

The cost of maintaining such an extensive and elaborate institution would necessarily be large anywhere. It is particularly burdensome where frequent violent storms and other climatic features are very destructive, where the remarkable corrosive action of the water necessitates constant repairs and renewals of the extensive piping system, where the support of every tree, shrub, and blade of grass requires the expenditure of no little money, and where by reason of the hospital's isolation wages are high and the delivery of supplies expensive; and there is reason to apprehend that the charge for maintenance will progressively increase rather than diminish.

PERSONNEL.

The personnel consists of the medical officer in command of the hospital and station, the executive surgeon, a pay officer who officiates in the capacity of paymaster, purchasing pay officer, and general storekeeper, a variable number of junior medical officers, a pharmacist, paymaster's clerk, 8 hospital stewards, 27 hospital apprentices first class, and hospital apprentices, one of whom is a dentist, a pay officer's stenographer and typewriter, a yeoman second class, a marine

guard of 30 men, about 60 permanent civilian employees, and a fluctuating number of skilled and unskilled day workmen. The day workmen are required because for over two years neither repairs, improvements, nor construction have been done by contract. The results have been more satisfactory and in general their cost less than under the contract system.

All of the cooks and most of the mess attendants are Chinese. They command very high wages, but experience has shown that in the commissary department Chinese are more dependable than are Japanese or Europeans. Owing to the well-known characteristics of the working members of this race their employment in such an isolated place as Fort Lyon is particularly desirable. European servants are scarce and nomadic and require diversion not readily obtained at this hospital.

It will be observed that the personnel does not include any women nurses. This is because it has not been practicable to provide proper quarters for them. The writer is of the opinion that female nurses would be more suitable than male nurses in the infirmaries of the sanatorium, but not in the wards for ambulant cases. The infirmaries, of course, contain the advanced active cases that require the delicate attention and the long-continued patient care for which female nurses are presumed to possess in a preeminent degree the necessary attributes. It is from such patients that arises the sanatorium's greatest menace to the health of the staff. Obviously all nurses should occupy quarters so designed as to favor to the utmost life out of doors and to afford every other possible feature tending to maintain or develop the resistance of the individual. This principle is especially applicable to nurses attending the more dangerous patients of the infirmaries, and such quarters are particularly desirable for female nurses, as women are probably more susceptible than men to tubercular infection and their mode of living is more restricted. When funds are available for building suitable quarters, the introduction of female nurses doubtless will be recommended.

The staff also lacks a pathologist and an officer skilled in nose and throat practice.

An excellent field for pathological work in connection with tuberculosis is afforded by the character and scope of the institution. Tuberculous patients of all kinds in all stages of the disease are received, far-advanced as well as incipient cases. A considerable number of examples of the various stages of pulmonary tuberculosis remain in the hospital until the end. Therefore this hospital differs from most sanatoria for tuberculosis in that many cases come to autopsy. Here, consequently, is an unusual opportunity for practical study of the pathology of the disease. To take advantage of

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this opportunity an officer who is a pathologist, and whose duties would be confined to the pathological department, should be attached to the hospital, and he should have all necessary assistance and adequate apparatus.

As would be expected in a tubercular hospital, the nose and throat work is very important. A rather large proportion of the patients present involvement of the throat and nasal passages, and proper attention of these patients would call for nearly the entire time of one medical officer. Under existing conditions it is necessary to delegate much of this work to a hospital corpsman under the direction of a medical officer whose duties are multifarious and who, therefore, can not give the subject the close personal attention its importance deserves.

It is expected that when the medical corps of the Navy has attained greater numerical strength the deficiencies mentioned will be rectified.

CLIMATE.

As to the climate, and in this term is embraced the influence of altitude, an experience covering a residence of over two years convinces the writer that, notwithstanding certain unpleasant characteristics, it should be classed as exceptionally agreeable and as decidedly favorable to the arrest and cure of pulmonary tuberculosis, provided the patient arrives in an early stage of the disease. Advanced cases do not, as a rule, share in this benefit, presumably because of the considerable additional burden thrown on the functioning portions of the lungs and on the weakened heart by the effects of an altitude to which the patients have never been accustomed.

It is true that the temperature often falls very low in the winter and rises very high in the summer, but the cold and the hot seasons are relatively short and, the air being very dry at all seasons, the extremes of temperature are not so severely felt as are more moderate temperatures in humid climates, and there is always a difference between the night and the day temperature that affords relief from the discomforts of the extremes of heat or cold. Moreover, sunshine is nearly constant; the little rain that falls is almost always in brief showers, prolonged rainy weather being almost unknown; snowfalls are infrequent and light, and the snow rapidly disappears by evaporation. Under these conditions there is little interruption to life in the open air. The most objectionable features are the prevalence of hay fever, the frequent high winds, occasional dust storms of distant origin, and the local atmospheric disturbances that fill the air with dust from the roads and the adjacent uncovered plains and river flats. The dust evil is the most serious objection to Fort Lyon as a site for a sanatorium. During dust storms the patients suffer from increased cough, rise of temperature, and the mentally de-

pressing effect that these storms produce upon the healthiest individual. Flying dust of local origin can be diminished in a measure by putting the desert soil under cultivation and by as liberal sprinkling of the hospital roads as circumstances permit. At present everything practicable to accomplish this end is being done, and there is hope that before long we shall have on the reservation a well-watered oasis of considerable area with consequent mitigation of the dust nuisance pertaining to a dry climate.

Respecting the part played by climate alone in the cure, arrest, or amelioration of tuberculosis in this locality, the writer feels that there should be attributed to the climate a larger share of the credit for the excellent results obtained than many writers and observers seem willing to allow. It is impossible to estimate the degree of the importance of climate, but it is believed that, all other factors being equal, patients in an early stage do better here than they would do in the localities from which they came. Practically all of the patients are from the sea level of various climates. This is true also of a large proportion of the members of the staff, and it is almost the invariable rule that members of the staff, as well as early stage patients, gain markedly in weight after a short sojourn, which fact suggests that the climatic conditions have a favorable influence upon metabolism, and whatever favorably influences metabolism should be an important factor in the cure, arrest, or amelioration of the disease.

CARE OF PATIENTS.

During the first three years of the existence of the hospital treatment of tuberculosis by hypodermic or intramuscular injection of preparations of mercury was given a very thorough trial, nearly all of the patients volunteering with much enthusiasm to take this promising cure. The results, however, were disappointing to all of the members of the medical staff except the author of the method. It was finally abandoned not only as useless but as misleading and therefore as unjust to the patients who were inclined to place their faith in the alleged specific to the neglect of simple measures of established value. Subsequently some tentative efforts were made with tuberculin, but the results were not encouraging, and while the favorable reports from other sources respecting the use of this article are followed attentively and with due consideration, the feeling exists that it will be in the interest of our patients to defer its use until more definite indications and methods have been formulated and more convincing reports of its safety and value have been published.

On arrival at the hospital patients are handed printed instructions stating briefly and in simple language the essential cause of tuberculosis, the precautions necessary to prevent its spread from the

infected to the noninfected, and the principles of sanatorium treatment by means of fresh air, nourishing food, and regulated rest and exercise. During the patient's career in the hospital these printed instructions are supplemented by lectures, by incidental oral teaching through contact with the medical officers and hospital corpsmen, and by the current talk on the subject of the disease. So that after a sojourn of a few months an intelligent and well-disposed patient should possess a knowledge not only beneficial to himself, but actively or passively of value to the community in which he may live after his discharge.

The practice of forced feeding in vogue in some institutions is not followed at Las Animas. Patients are taught the importance of taking an abundance of nourishing food and how to encourage appetite and relish for their meals. They are tempted by a table that is liberally supplied with a varied assortment of the best foods that near and far markets afford, prepared by excellent cooks, and served in well-lighted mess halls in an unusually attractive manner. Special diets meet the needs of certain patients for whom the routine or house diet is not suited. Milk without limit is served at meals and milk and eggs at stated hours between meals, and patients are encouraged to partake as freely of these luncheons as may be done without impairing the appetite for the regular meals.[1] It is believed that the end desired is more surely reached by this method than by the practice of forced feeding.

The importance of rest is recognized, but there exists a conviction, based upon experience, that rest without careful discrimination may be carried to extremes, to the physical as well as the mental and moral detriment of the patient. In very active cases, whether incipient or advanced, absolute rest in bed is essential, but in cases having little activity or none and presenting evidence of an encouraging degree of resistance, a certain amount of physical exercise with mental occupation is beneficial. With this belief established, an effort is now being made to reduce exercise and rest to Paterson's systematic method founded upon the theory of auto-inoculation—a method and a theory that appear to the writer to be philosophical.[2] Under the zealous and intelligent supervision of the medical officer in charge of the patients the practice indicated is safely carried out not only with consequent physical benefit, but with the effect of obviating the tendency toward what is called the "sanatorium habit."

[1] Soon after this article was written the luncheons between meals, except in special cases, were discontinued. It appeared that more certainty of satisfactory nutrition would be achieved by eliminating possible interference with appetite for the regular substantial meals. After several months' trial no results have developed to cause recurrence to the abandoned practice.

[2] Since this paper was written graduated labor has been on trial at this hospital for about eight months. The writer is convinced that the method has the value claimed by its author, Marcus Paterson.

An enslaving reluctance to do any kind of work or have any occupation that does not afford amusement is one of the results of prolonged treatment of this disease by physical and mental rest. Furthermore, in a large body of men of various temperaments and antecedents and possessing a steady unearned income, there also follows the usual train of evils that spring from idleness, as gambling, drinking, other forms of dissipation, and even serious crimes. Since the establishment of this institution there have occurred, besides the common minor delinquencies, such crimes as highway robbery, petty thieving, robbery of the dead or dying, incendiarism, and attempted homicide. Many patients, particularly those in whom the disease is unaccompanied by much constitutional disturbance, do not believe or do not realize that they are sick men—that they have a serious infection. Therefore, in the absence of any occupation, their thoughts are apt to run to easy living and amusement, the amusement being too often of a character not beneficial to the patient's health. Accordingly patients are taught that a certain amount of physical and mental occupation tends to their advantage. To awaken their interest in the subject and impart a stimulating sense of immediate achievement, usefulness, and responsibility, they are further informed that every patient is expected to render as much service to the hospital as his physical condition may justify. This service is furnished incidentally in executing the Paterson method.

To provide for their future welfare, patients are advised to avail themselves of the opportunities which the hospital and its vicinity afford to acquire knowledge of such occupations as would be suitable for them, in view of the nature of their disease, after discharge from the hospital and the service. Trades and occupations in great variety are represented in our patients whose skill therein covers a wide range, and as the hospital is an isolated village, largely dependent upon its own resources, an excellent opportunity is afforded patients to practice their attainments and advance their proficiency. Moreover, the hospital is situated in a district where agriculture and stock raising are the principal industries, and the hospital reservation, embracing about 600 acres, is being developed by means of irrigation from a desert waste into lawns and productive farms and gardens. It is possible, therefore, for patients to acquire for their future use knowledge and experience relating to these subjects as they are practiced in the arid regions of the West, and at the same time relieve the hospital fund of some of the heavy burden it is carrying in their behalf. It has been found that the greatest difficulty to overcome is the patients' disregard of the future and their reluctance to take advantage of the opportunities offered. Few have profited by the facilities indicated and fewer still have shown any inclination to render some equivalent for their care and for the pay they receive

until the expiration of their enlistment, though there are now encouraging signs that as a result of persistent, tactful efforts on the part of the medical staff, judicious disciplinary methods, and the gradual elimination of the perverse a better spirit is being awakened.

PROSPECTIVE NEED OF INCREASE IN THE CAPACITY OF THE HOSPITAL.

If the Navy continues to expand and the present ratio of tubercular patients is maintained, and unless steps are taken to lessen the number of admissions and to limit the length of the period of treatment, it will eventually be necessary to increase the capacity of the institution, and this can not be done without a corresponding addition to the administrative features, as heat, light, water supply, refrigerating facilities, and sewage disposal. This means not only a large expenditure of money for construction, but a corresponding increase in the annual cost of maintenance, a charge that for reasons stated above is already a notable burden.

It is the wise policy of the bureau to condemn as unfit for future general service every member of the naval personnel in whom there develops a well-defined case of pulmonary tuberculosis. For obvious reasons this policy is for the welfare of the infected individual as well as for the protection of the noninfected personnel. Therefore, as pointed out by the Surgeon General, the maintenance of the hospital is based upon a humanitarian motive rather than upon an intention to restore infected persons to usefulness in the Navy. It might be said that the humanitarian motive embraces the possible duty of the Navy to take part in the great crusade against the propagation of the disease, but it would seem that the department would be doing its full duty in this respect if it limited its activity to providing liberally for patients whose length of service is an assurance that the Government's obligation to them is a moral certainty. As for the large number of recently enlisted men who soon reveal an infection, would not the department's obligation be fulfilled if such patients were returned at Government expense to the communities in which they were recruited? Why should a man who doubtless contracted tuberculosis prior to enlistment be sent to the Las Animas Hospital to remain there as long as he wishes to stay, or who, having had his transportation paid to the hospital, soon gets tired of the place and puts the Government to the expense of returning him to his home? An analysis of the records shows that a considerable proportion of the patients admitted into this hospital were in the service but a few months before symptoms of tuberculosis were discovered. Should the maintenance of these patients become a prolonged charge on the hospital fund and the naval appropriations?

To avoid the necessity of expanding the capacity of the hospital with consequent increase in the cost of maintenance and to reduce

the present operating and transportation expenses, the writer would propose adoption of the following measures:

1. All patients in whom the disease is believed to have originated prior to enlistment to be detained in camps at the general hospitals until fit to travel to their homes or to the communities from which they were drawn; then to be discharged from the service and furnished with transportation to their destination.

2. A patient who incurred the disease in the line of duty to be allowed to choose between immediate discharge from the service and transfer to Las Animas, provided the stage and activity of the disease and the patient's ability to provide for himself would justify such discharge. This measure probably would reduce the considerable number of patients who by applying for discharge soon after arrival at Las Animas render useless the Government's expenditure for their transportation and temporary care.

3. Failure of any patient in the hospital to cooperate with the staff in efforts to arrest or cure the disease, and disregard of the rules established to prevent spread of the infection, or other grave delinquencies, to be followed by discharge of the patient as undesirable for the service, instead of by discharge on recommendation of a board of medical survey, as not amenable to treatment by reason of misconduct, as is now the practice. This method would save expense of transportation and serve as a more efficient check upon the unruly.

4. Discharge from the hospital and from the service with Government transportation home of all patients in whom the disease is arrested or apparently cured. A suitable pension would provide for any diminished earning capacity resulting from the disease.

5. Every patient to be required to render as much service to the hospital as his physical condition may justify. Such service would reduce the pay roll by diminishing the number of civilian employees and incidentally benefit the patient. This measure is now being established in connection with the Paterson mode of treatment.

6. It being quite certain that Las Animas is not a suitable place for advanced cases, it might be advisable, should permanent overcrowding threaten, to provide a hospital for such cases at a lower altitude in a locality where the cost of maintenance would be less than at this hopital, and where there would be some saving in the expense of transportation. The writer would even venture the suggestion that a tuberculosis hospital established in a suitable place, as regards climate, altitude, and environment, on each coast of the United States, with a view to eventually abandoning the Las Animas institution, might result in ultimate pecuniary saving without detriment to patients in any phase of the disease.

HOSPITAL SHIPS FOR FISHING FLEETS.

By J. L. Neilson, Surgeon, United States Navy.

Few people, other than those related to or brought into direct contact with the personnel of the great fishing fleets of the world, realize the number of individuals engaged in the trade of deep-sea fishing, or have any but a vague notion of the hardships which these men undergo in order that the demand for fish food may be satisfied, and fewer still are aware of what is being done to relieve their sufferings and privations. Thrilling novels have been written of this life, and anyone who has read Kipling's "Captains Courageous" can not help but admire the hardihood, skill, and perseverance of these men and ponder over the details of their life which are thus so superficially touched upon. To the medical mind appear fleeting views of the sanitary conditions which must exist on these vessels, of the sorry plight of the sick, and the results that follow the constantly recurring accidents, exposures, or the introduction of contagious diseases, but all these hazy mental pictures usually fade, disappear, and are forgotten soon after laying aside the book that has proven so interesting.

There are men, however, who have pondered over this question, have investigated the fleets in action, realized the needs, and lent their aid in endeavoring to relieve the situation.

Picture to yourself these staunch little fishing vessels putting to sea equipped for a stay of months in the open ocean, where their crews are absolutely cut off from their families, their sources of supply, the whole world, in fact, and engaged in a trade the daily performance of which is hazardous to life and limb. They are vessels of only 90 to 150 tons, but so constructed as to withstand the stormiest weather, yet, in spite of their isolation, the dangers of the occupation, and the remoteness of professional care, the word "equipped," in so far as medical and surgical supplies and services are concerned, means at most a small chest of simple remedies and a few bandages, to be prescribed or applied by the skipper of the schooner, or one of the crew who has shown an interest in such matters and developed a certain skill, which in most instances is self-taught.

It is not an uncommon occurrence for a skipper and crew to fit out a schooner, spend a week or more getting bait, and working into a good berth only to find that one of their number is sick. For a time the unfortunate sufferer is cared for by the skipper, but it soon becomes apparent that professional service is imperative. The valuable bait is thrown overboard, the hard-earned "good berth" is given up, and the schooner heads for the nearest port, where the stricken man can obtain treatment and a new hand be shipped.

Such sacrifices are undertaken willingly, but it means much to married men or those with dependent relatives, for the families at

home can ill afford to bear such loss. In addition, the patient may die during the trip or reach expert aid at such a late date as to preclude any result other than crippling for life or a physique so ruined as to be rendered unfit to meet the hardships of the chosen trade. It is a common sight to see these wrecks of humanity in the fishing villages of the New England, Nova Scotian, and Newfoundland coasts.

From such a condition of affairs there arises great unnecessary suffering and loss of life, not to mention financial embarrassment, much, if not all, of which could be relieved by the presence with the fishing fleet of a well-equipped hospital ship.

The first nation to realize the necessity for looking after the welfare of its fishermen was England, where in 1880 the Royal National Mission to the Deep-Sea Fishermen was founded. Originally this society sent mission ships to the fleet in the North Sea, furnishing the mariners of all nations with useful articles of clothing and instructive literature and tracts aimed to induce abstinence, carrying on a conflict with the floating saloons or public houses sent out by the Germans to these waters. They also rendered medical aid, such professional services being roughly performed by the skippers, many of whom had received first-aid instruction in the London hospitals.

When Sir Frederick Treves was appointed the director of the Royal National Mission, he visited the fisheries to see if hospital ships would be of value, and was so impressed with their necessity that he immediately took steps to provide one. As the result of his efforts, one of the mission ships was equipped with a more elaborate medical and surgical outfit, and Dr. Grenfell, then a young surgeon in London, was sent with her to the fishing banks.

From this trip Grenfell returned full of enthusiasm, and through the influence of Treves and himself the first hospital ship for the fishing fleet, the *Queen Victoria*, was fitted out, since which time three hospital ships and four dispensary ships have been added. In 1901, 12,000 men were treated or carried to home ports from the North Sea alone.

As a rule the dispensary boats or "medical mission ships" have a crew of 10 men and a hospital attendant, who has received necessary instruction from the society, but these vessels carry no doctor. They care for minor ailments on board the fishing smacks and serve to transport the grave cases either to the shore hospitals or the hospital ships.

These latter vary in size from 100 to 300 tons, and have on board, besides the crew, one or two hospital attendants and a doctor. The cabin is usually on the starboard side aft, while the consulting room is well forward. Between these, amidships and communicating with

both, is a ward of six berths. In the hold are located the store-rooms and pharmacy, and there is usually a library.

The Mission to the Deep-Sea Fishermen now includes a large number of vessels, which operate over all the fishing ground as far as Labrador.

In 1892 Dr. Grenfell sailed for Labrador in a 90-ton schooner to carry on the same work, and since his coming has acted as " surgeon, master mariner, minister, and magistrate " to the fishermen of that coast. His first trip was made in a 40-foot steam launch, but since that time his work has been extended, as is well known, and he received from an American friend a few years ago a fine auxiliary steam schooner, the *George B. Cluett*, and also two yawls, the *Yale* and the *Andrew J. McCosh*, both presented by American college students, which gifts have aided him in carrying on the remarkable and valuable charity with which all are familiar.

France was not far behind England in efforts to relieve the deplorable condition of its deep-sea fishermen. In 1894 the Society of the Workers of the Sea (Société des Œuvres de Mer) was founded for the purpose of carrying aid (material, medical, moral, and religious) to mariners of all countries as well as of France, and more especially to the deep-sea fishermen.

Organized by a retired naval officer, M. Bailley, and aided by the advice of Admiral Matthieu and Vice Admiral Laffont, the society fitted out a hospital ship in 1896, but unfortunately this three-masted sailing vessel, the *St. Pierre*, was lost on the coast of Newfoundland on its first trip. In 1897 two other vessels, the *St. Pierre, 2nd*, and the *St. Paul*, were equipped and sailed for Newfoundland and Iceland, respectively. The former was damaged by a collision on the Grand Banks, and the latter ran ashore off the Iceland coast, but these accidents came to pass only after the ships had rendered considerable aid to the fishing fleet. Both vessels were repaired and visited the fishing grounds in 1898 and 1899, but in the latter year the *St. Paul* was wrecked and became a total loss.

Owing to the splendid work that these ships had accomplished great interest in the society was aroused, and not only did the gifts increase in amount, but the work received recognition by the Government, which declared it a public utility, authorized it to have its vessels act in the capacity of post offices, and granted it a small subsidy. The latter aids to a slight extent, but the society still depends almost entirely upon the unreliable source of private subscription.

In 1900 a steel barkentine, with auxiliary steam power, was donated to this society, and in 1901 this vessel (the *St. François d'Assise*) was equipped and departed for Newfoundland, while the *St. Pierre* was assigned to Iceland waters. In 1903 the resources of this charity

were so reduced that only the *St. Pierre* was sent to the Banks, while the *St. François d'Assise* lay dismantled at Havre, and the Iceland fishermen were left without aid. The following year, however, the *St. Pierre* was sold and the *St. François d'Assise* was equipped to carry on its errand of mercy and has been sent out alone year by year since that time until very recently, when an additional vessel was obtained.

During the years 1897 to 1907 the hospital ships of the Société des Œuvres de Mer spoke 6,585 fishing vessels, treated 811 patients on board, with 12,076 sick days, and held 3,250 consultations at sea. They also rescued 297 shipwrecked sailors, returned 351 convalescents and sick men to France, gave medicines to or replenished the medicine chests of 1,295 ships, and received or delivered 212,191 letters. During 1911, as stated in a recent consular report, the *St. François d'Assise* steamed 12,209 marine miles, spoke 1,143 vessels, admitted 70 patients to the hospital, and gave treatment at sea in 420 other cases, besides picking up 14 shipwrecked persons.

When it is appreciated that this vessel leaves France in May and returns in September, the amount of work accomplished is astonishing, and consideration of the above figures indicates the extent of the moral and humanitarian aid that is rendered.

Every vessel with flag half-masted (the signal that help is desired) is visited, regardless of nationality, and treatment is accorded to all alike, no charge being made for either medicines or medical attendance. Consultations are held on board the hospital ship, the milder cases being returned to their ships after the method of treatment has been indicated, the graver ones being admitted to the hospital, where they remain until well or until transferred to a hospital on shore, either in France, Iceland, or Newfoundland. In Iceland the society's hospital is located at Faskrudfjord; in Newfoundland, at St. Pierre; but in addition patients are admitted to military hospitals and to those of various religious and charitable organizations.

A brief description of the *St. François d'Assise* will serve to depict the arrangements of this vessel and the conditions under which the professional services of such value are carried out.

As stated above, the *St. François* is a steel barkentine of 600 tons, about 164 feet long, and having a draft of 14 feet amidships. One double-ended boiler supplies steam to the 300-horsepower compound engine, which develops in the vessel a speed of about 8 knots an hour. She has two decks, the weather and berth, and a hold, while there is a small deck house located around the funnel, and the forecastle and poop are slightly elevated above the midship section of the upper deck.

In the superstructure just forward of the funnel are the galley and large consulting room, the latter with a cloak room and lavatory adjacent, and well forward under the slightly raised forecastle is the disinfector, which is so arranged as to be adapted to disinfection of clothing, etc., by steam under pressure, and letters, etc., by gas.

Below the weather deck the vessel is divided into six main compartments by thwartship vertical bulkheads extending from the deck above to the hull. Each of these compartments is divided into an upper and lower portion by the berth deck.

From before aft the first compartment contains the space for the shipwrecked, beneath which is the forepeak.

In the second division is located the crew's quarters, which are well ventilated and lighted and serve to demonstrate the arrangements and conditions which should be introduced upon the fishing vessels, to those who build and equip them. The lower part of this division is occupied by two water tanks of 8 tons capacity each, and the chains.

In the hold of the next compartment is found space for all provisions, the wine cellar, and a large pantry, entered by a broad hatch to the upper deck, beneath which lies a large ballast tank of 20 tons capacity. The upper portion provides an isolation ward of 14 beds and two hammocks, extending clear across the ship. A small part of this ward is taken up by a room for bathtub and water-closet.

The fourth compartment is occupied below by the coal bunkers and above by the main ward. This ward is provided with 16 swinging cots, four hammocks, and four stationary couches, giving a total capacity of 24 beds. Aft in this section, on the same deck with the ward and opening into it, are located the dispensary, lockers for linen, blankets, and other bedding, and, lastly, the room for the hospital attendant. It is here that the operating table is set up when needed and fastened to the stanchions to resist the rolling of the ship. It is also used as a recreation and mess room.

The fifth compartment is occupied largely by the engine, boiler, and evaporator. Grouped around the engine and fireroom uptakes are the rooms for the two engineers and the stokers.

In the compartment farthest aft are located the quarters of the officer personnel. The officers' bathroom, a spare stateroom, and the rooms of the first and second officers (*second captaine* and *lieutenant*) open directly into the wardroom, while those of the captain, doctor, and chaplain open into a passageway running forward from the wardroom. On the port side and opening into the same passageway is a board room. Aft of the wardroom is an office, a water-closet, and a linen locker, and two storerooms for provisions. The lower part of this compartment is occupied by a storeroom for medicines and a sail locker.

A single ladder just forward of the foremast gives access from the upper deck to the seamen's quarters, steward's room, and the compartment devoted to those who have been rescued from shipwreck.

To reach the isolation ward one must pass through the main ward, which is connected to the weather deck by a single ladder passing through a hatch which opens into the consultation room in the superstructure. This ladder is just forward of the main mast. On the starboard side of the mizzen mast a single ladder serves the purpose of reaching the upper deck and chart room from the wardroom, while on the port side a short ladder leads to the engine room.

Communication between decks is continuous from the wardroom to the isolation ward, via a passageway on the port side of the engine room and the main ward.

The total capacity of this vessel for sick is 40 beds, besides which she has ample room for a crew of 27. It is provided with natural ventilation only, ports, hatches, and ventilators acting as intakes and outlets. By day she is well lighted by large skylights and ports, and at night by oil lamps. Steam radiators throughout the ship furnish ample warmth to withstand the cold of the North Atlantic.

From the location of the isolation ward and its arrangement of entrances it is necessary to depend upon the "barrier" system and bedside isolation in order to prevent the spread of contagious diseases, and the provision of hanging sheets and constant use of chloride of lime in disinfecting the decks has worked well in preventing cross infections.

One feature is of particular interest. The swinging cots that are provided for the wards are stiff framed and so arranged as to be easily detached and interchangeable, and are used as stretchers in transporting the graver cases from ship to ship or from ship to shore.

Turning now to the United States, we ask with reluctance the question: "What is this country doing to relieve the privations of the hundreds of its citizens that are engaged in the trade of deep-sea fishing?" So far as the author knows, the answer is "Nothing." As far as has been ascertained, neither Government nor charitable society has as yet lent them assistance on the high seas, and their only source of relief has been the French hospital ship and the work of Dr. Grenfell, the latter, as has been seen, having received a gift of three vessels from American citizens.

In 1798 the Marine Hospital Service was established for the purpose of caring for the sick and injured of the merchant marine, and the years that have elapsed since that remote date have witnessed the development of a well-equipped system of hospitals throughout the United States, devoted to this purpose.

These hospitals have accomplished an immense amount of good, but there still remains a large field of activity in which the shore

hospital can take but little part, namely, the care of the personnel of the great fleet of American fishing vessels which ply their trade in the North Atlantic.

By all those who have investigated this subject, the opinion is unanimous that of the various kinds of charities and aids developed for the relief of these men the hospital ship is the best.

Such a vessel should not only care for the sick and injured suffering from minor ailments on the spot, but should be prepared to treat the more serious cases on board and transport them to a harbor where the better equipped shore hospital stands ready to receive them. During these trips she should act as a mail boat to carry the messages of the fishermen to their anxious families and to return with mail and papers for the fleet, thus relieving the months of privation and isolation.

It is such a vessel that the United States Public Health Service has been striving to obtain since 1902.

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PREVENTION OF THE SPREAD OF INFECTIOUS DISEASES ON SHIPBOARD.[1]

By E. R. STITT, Medical Inspector, United States Navy.

The problem of dealing with infectious diseases on shipboard falls naturally under the following two heads:

1. Measures to prevent the introduction of such diseases, to limit channels for the spread of the infection and, in particular, the methods of procedure to detect the first case of an infectious disease developing on board ship.
2. The handling of such cases when they are discovered.

As regards the first consideration the medical officer should at all times keep himself informed as to the prevalence of infectious diseases in the ports visited by his ship. Such information is often more satisfactorily obtained through unofficial sources where the same necessity for conservatism does not exist as would be the case with official reports. It must be the experience of everyone that information of the presence of a serious epidemic may first be obtained from observant laymen attached to his consulate who may

[1] Read before the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., Sept. 23–28, 1912.

have noted an unusual prevalence, peculiarity, or fatality of some morbid condition not usually so characterized. How often cholera is first reported as ptomaine poisoning, yellow fever as dengue, or varioloid as ckicken-pox.

The instinctive conservation of the medical man makes even those who are not occupying official positions hesitate to express any view as to the existence of a certain disease unless the evidence is fairly convincing, and for an official the demands of commerce require that clinical, epidemiological, and, where possible, laboratory proof be obtained before an admission of the presence of such a disease can be elicited by the inquiring medical officer.

Furthermore, many diseases which can seriously disturb the routine of a warship are not considered of sufficient importance in many municipalities as to be notifiable. This is true of measles, mumps, chicken-pox, and rötheln, cases of which may not only not be matters of official record, but may become such matters of course as not to make any impression upon the medical or lay mind and about which definite information is unobtainable.

With a knowledge of the particular disease to which the crew may have been exposed, suspicion may be entertained as to the development of such particular disease and the methods of physical or laboratory examination of the crew as a whole be directed accordingly.

Of prime importance is it for the medical officer to cultivate rapid methods of determining any deviation from the normal of the body temperature, changes in the pulse rate, abnormal congestions or deposits about the throat, and in particular the inspection of the face and neck for skin eruptions.

Such examinations should be entirely objective, and it should be possible to make such examinations at a rate of from 15 to 25 men per minute. It is well, however, to have the word passed for all men who do not feel well to drop out of line and report for a more careful examination than the rapid objective one of the crew in line.

About 12 years ago I was attached to a ship where we put to sea for a cruise to the West Indies, 2 days after receiving on board a draft of about 300 naval apprentices, and by reason of their having been exposed to measles just prior to coming aboard, and furthermore from the fact that cases of mumps and scarlet fever in men of the regular crew had only recently been sent to hospital, it was necessary to take steps to detect the first appearance of any of these diseases—measles, mumps, and scarlet fever. The method of examination as carried out was to have the men drawn up in line facing the light, the right hand was then passed down the neck opening of the shirt, with the dorsal surface touching the skin of the chest as far down as the lower part of the sternum, with the left hand the pulse was esti-

mated, and a quick glance for any eruption about face or base of neck made; the man was then directed to open his mouth wide and say "Ah."

I do not think I exaggerate when I state that this cursory examination would in all probability enable one with experience in its carrying out to detect at an early stage any important infectious disease, with the possible exception of cholera or bacillary dysentery. The expedient of having those who did not feel well drop out of line accomplished the purpose which would have been derived from a questioning as to subjective symptoms.

As is well known to quarantine officials, the thermometer is invaluable in detecting the onset of the vast majority of contagious diseases. It is my belief that with a little experience anyone can train himself to recognize an elevation of temperature approximately 1° F. with the back of the hand applied as above described. Of course, we know that in a patient with the onset of a chill we have a contraction of the superficial vessels and that such a person would not give the sensation of increased temperature. The error would be checked by the general appearance of the man as a sick man, in case he had not fallen out of line with those not feeling well.

It has not been my experience that profuse perspiration made much difference, provided the chest was well protected by the shirt and the hand pushed down well below the middle of the sternum.

Doty's experiments (N. Y. Medical Record, Nov. 1, 1902) showed that the temperature in health almost never exceeded 99.5° F. and that temperatures approximating 99° F. were only found in the afternoon. It would, therefore, seem reasonable to consider that in a morning examination the highest temperature in a well person would not exceed 98.5° F. My experience is that a temperature of 100° F. or above is almost of certainty to be detected.

The taking of the pulse rate with the left serves as a check on the impression of increased temperature noted with the right hand. The noting of four or five pulse beats is sufficient to give one information as to increased rapidity. Naturally very little importance could be attached to the approximate pulse rate alone, especially under the conditions of the examination, but the value attributed to it is simply one of confirmation.

As regards the cursory inspection of the face and base of neck well down to the clavicular region, it would suggest itself that the inspection of such a limited skin surface would not be applicable to chicken-pox, as would be the case with small-pox, measles, rötheln, and scarlet fever. While, of course, in chicken-pox the predilection of the eruption for the trunk is rather characteristic, yet it is exceptional that there are not a few discrete vesicles on the face.

It is rather interesting that among the Filipinos the face in chicken-pox is so extensively and so early involved as to make one suspicious of small-pox. The shirt of a sailor is cut sufficiently low to give a view of the base of the neck, and even the subclavicular region, the favorite sites of the early appearance of the scarlet-fever rash.

The expedient of having the person inspected open the mouth wide and give utterance to the sound "Ah" will almost surely bring out mumps in its incipiency, provided there is not some other cause which would prevent the wide opening of the mouth. It is surprising in what a large percentage of persons an adequate inspection of the pharynx and tonsillar regions can be obtained without the use of some form of tongue depressor.

This inspection of the throat would act as a control on those diphtheria cases where changes in temperature and pulse might not be appreciably altered from the normal. Koplik's spots are well shown, and in the majority of cases streptococcic, scarlatinal, and Vincent's anginas.

It must be carried in mind that this examination is only a preliminary to a thorough one to be subsequently made of any person whose condition may excite suspicion—it is an emergency method of selecting those in whose cases the confirmatory clinical thermometer is to be used. This method is applicable for the detection of those tropical diseases in which extension is to be feared, with the exception of cholera and bacillary dysentery. Such cases, however, are ones which would respond to the call for the dropping out of line of those feeling sick.

The limiting of the spread of an infectious disease from a case prior to its detection is best brought about by rigid adherence to the accepted rules of personal hygiene, of which the most important are avoidance of common use of articles of necessity or luxury. The drinking cup and toilet necessaries are instances of the first; the pipe, cigarette, and bottle of ginger ale of the second. Of course, the bubbling fountain, when properly used, does away with the dangers from the common drinking cup, and elementary instruction as to the possibilities of infection from a pipe or cigarette which has been in the mouth of another person should prevent the latter.

The importance of washing the hands after defecation is well recognized as a measure to prevent the spread of such diseases as bacillary dysentery and cholera, not to mention this source of danger from typhoid carriers.

Owing to the limited space on board ship the carrying out of this paramount hygienic measure is a great practical difficulty. By the use of a series of rubber tubes proceeding from tanks suspended in the ships' heads, the end of each tube being plugged and several small

perforations being made just above the plug and the tube controlled with a Hoffman type pinch cock, there can be provided a means for supplying each man with a small but sufficient amount of water to wash his hands. Liquid soap and the paper towel now so generally in use would complete the provisions for washing the hands.

It now remains to consider the second problem of the question under consideration, viz, how to handle the case or cases of the infectious disease or diseases which have been found to be present. Of course, if opportunity be available, it is best to transfer cases to shore hospitals, a solution of the problem which is however only occasionally at hand.

In connection with the isolation of diseases having a marked degree of transmissibility, that is for those diseases for which the designation " contagious " is especially applicable, there has probably been too much attention paid to infection by air and fomites, and too little to that brought about by contact with sick or healthy carriers.

In civil hospitals for infectious diseases there are three well recognized methods for caring for the highly infectious diseases: (1) The cubicle system, in which glass partitions separate single rooms opening into a common corridor and administered as a single ward; (2) the barrier system, where recourse is had to some method of outlining the patient's bed with a cord, wet sheet, or even an encompassing white floor line; and (3) the bed isolation method, where dependence for the isolation of the patient rests solely upon the observance of rigid disinfection after caring for the patient.

Crookshank (Control of Scarlet Fever, Lancet, Feb. 19, 1910) states that in the method of bed isolation each patient is isolated in his or her bed without partition or barrier, and he shows by statistics that with the observance of medical asepsis cross infections of the common contagious diseases are no more apt to occur than do transfers of pus infections under surgical asepsis. In his method each patient has a complete outfit of articles necessary for his nursing which are frequently sterilized. The nurse carefully disinfects the hands and puts on a clean gown before passing from one infection to another.

More recently Rundle and Burton (Bed Isolation of Cases of Infectious Diseases, Lancet, Mar. 16, 1912) have published statistics of the treatment by the method of bed-isolation of 473 cases, including such diseases as scarlet fever, diphtheria, measles, rötheln, varioloid, etc., with only two cases of cross infection, these having in each case been from scarlet fever.

Although not strictly following the bed-isolation method, but rather a modified cubicle system, success in preventing cross infections at the Pasteur Hospital, Paris, is attributed to medical asepsis,

and here even small-pox is treated with a minimum of cross infections from such source. Of 1,994 cases of infectious diseases treated during a period of a little more than two years there were 524 cases of small-pox. While many would consider it feasible to treat ordinary infections by the method of bedside isolation, yet we would hesitate in connection with small-pox. As a matter of fact certain authorities have gone so far as to recommend the abandoning of isolation for small-pox, trusting solely to vaccination.

While Milne (Measles: Its Treatment and Prevention, Lancet, Apr. 22, 1911) attaches great importance to the local treatment of the individual patient's secretions, and although Crookshank rather favors a certain degree of spraying of throat and nasal cavities with oil sprays, this is not considered at all necessary by others.

The question of transmission of infections other than by contact transference seems to rest solely with Flügge's droplet method of infection. The experiments of Winslow with mouth streptococci (Bacterial Pollution of the Air, Journal of Infections Diseases, Jan. 15, 1910) would indicate that danger from such droplets would be slight. In these experiments plates placed only 15 centimeters in front of the mouth of a man coughing for three minutes showed only small numbers, and air taken at distances of 35 centimeters to 2.4 meters in front of persons speaking vigorously failed to show such mouth streptococci.

Strong's experiments with pneumonic plague (Journal American Medical Association, Oct. 14, 1911) lead him to state that owing to the enormous numbers of plague bacilli the opportunities for infection of the droplet method must be very great in pneumonic plague wards.

It would therefore seem that pneumonic plague would be a disease which could not be considered as one to be treated along the lines of bed isolation.

When we now come to consider the availability of some system of bed isolation, or rather medical asepsis, to the handling of such infections on board ship, we find that Beyer, in 1901–2, treated measles on board the U. S. S. *Prairie* alongside those sick with ordinary noninfectious diseases without having cross infections. In his method considerable attention was given to the local treatment of the patient both by nasal irrigation and antiseptic applications to the entire body. (Journal of the Association of Military Surgeons, 1904). While the tendency on the part of those ashore seems to be in the direction of bedside isolation, some going so far as to maintain that a cubicle or barrier system gives a false confidence which militates against the observance of rigid medical asepsis, the sole agent, in their opinion, which prevents cross infections; yet, when we note

that the cubicle system, or, rather, glass-partitioned isolation nests, is the system in the isolation pavilion of the Rockefeller Hospital, it would seem best that whenever possible ships of war should be provided with an isolation ward opening into the sick bay proper. We should then have the full protection that rigid medical asepsis would offer, and what in my opinion would facilitate the carrying out of medical asepsis—the isolation nest. The idea that the barrier or cubicle tends to lessen the observance of medical asepsis seems to me to be without foundation.

For those in attendance on the infectious sick a sheet may be made to answer for the separate gown used ashore.

It would seem better to trust to the thorough scrubbing of the hands of the attendants with liquid soap and water after caring for the patient rather than to trust to a short disinfection of the hands with bichloride; this latter might follow, but our dependence should rather be upon the thorough washing with soap and water.

As regards disinfection of all articles which may have come in contact with the infectious patient a method I have employed even in the handling of cholera seems to be applicable on board ship. It is to provide two wash boilers or similar receptacles equipped with steam pipes. One container is used for disinfecting the food dishes, the other for vessels containing the excretions of the patient, in particular the bed pan, which is submerged in the boiling water, pan and contents.

The thermometer is in my opinion of paramount importance in dealing with infectious diseases. Of course when possible there should be a separate thermometer for each patient, but when this is not feasible dependence should be placed upon a thorough washing with soap and water and then placing in 70 per cent alcohol rather than upon the more common method of putting the thermometer in a receptacle containing a formalin solution. Unless repeatedly renewed the formalin can not be relied upon to exercise its disinfecting power.

It would seem advisable to make use of local disinfection in many of the infectious diseases. Various applications will suggest themselves and in this connection it would appear that peroxide of hydrogen irrigations have given the best results in causing meningococci to disappear from the nasal mucosa of carriers.

While, as a rule, transmission of disease by fly and mosquito is of comparatively slight importance on board a warship lying at anchor some distance from the shore yet at times flies may become very troublesome by coming aboard from garbage lighters used to take away the ship's garbage and under such circumstances the usual methods for their destruction become necessary.

TREATMENT OF INSANE IN THE NAVY.

Being a discussion of the temporary treatment of mental aliens prior to their commitment to the Government Hospital for the Insane.

By G. A. Riker, Passed Assistant Surgeon, United States Navy.

As the treatment of insane patients in the Navy is usually limited to a period of several weeks, this article will be confined to conditions arising early in psychoses followed by some suggestions that are deemed advisable to adopt for the benefit of those unfortunates who have been either temporarily or permanently deprived of their power to properly adjust themselves to their surroundings.

The mental diseases most commonly observed in the Navy are dementia præcox and manic depressive insanity, with an occasional case of paresis, alcoholic delusional insanity, Korsakoff's disease (polyneuritic psychosis), the psychoses sometimes associated with epilepsy and rarely paranoia.

To consider the treatment of this class of patients with such modern methods as hydrotherapy, isolation, and the absence of restraint, is almost impossible on board ships of the Navy, and not much more practicable in our hospitals, so that we must content ourselves by instructing the members of the Hospital Corps in carefully watching the patients: First, that we may obtain a fairly accurate account of the symptoms present in order that the case may be presented in a clear light to those who are to treat the patient later; and, second, to prevent self-destruction, or injury to other persons or Government property.

As an accurate and exhaustive history is absolutely essential in all cases of insanity, the diagnosis, prognosis, and treatment depending to a certain extent upon its completeness, it may be well to enumerate some points that should be investigated.

1. Endeavor to procure the character of the patient's life before entrance into the Navy from other members of the crew coming from the same town, inquire for evidence of inebriety, epilepsy, or irregularity in parents or other relatives.

2. History of oncoming of present attack from the officer and petty officers under whom the patient has been working with reference to the character of work, the degree of pleasure with which it was performed, his ability to accomplish things, his ingenuity, his manner with officers, petty officers, and other enlisted men, his dress, the manner in which his liberties are spent, particularly as to whether or not he is companionable, or addicted to alcoholic or sexual excesses.

The social condition, and relations of the patient with his family are important, as frequently domestic troubles form the nucleus of great mental unrest in the mind of a psychopath, and, while such

difficulties may seem slight to one whose mental equilibrium is not disturbed, they show, in the patient, a lack of judgment and ability to cope with the usual annoyances of life.

The history of the case from the time the patient comes under the observation of the medical officers should include the physical examination, noting motor activity or retardation, scars or depressions about the scalp, anatomical stigmata of degeneration, tremors, defects of speech, and the deep and superficial reflexes.

The mental examination should note the patient's facial expression, attitude toward the examiner and surroundings, orientation for time, place, and person, memory for past and recent events, power of concentration, judgment, manner of talking, flight of ideas, if present, whether or no delusions or hallucinations are present, and if so the character of these.

An accurate account of the actions of the patient must be recorded, stating the amount of sleep obtained, manner of eating and amount of food taken, habits as to personal cleanliness and dress, excitement or depression and the degree of either, whether there are suicidal or homicidal tendencies, and a general outline of the delusions or hallucinations should they be present.

The above, while not as exhaustive an examination as is conducted in most hospitals especially adapted for the treatment of the insane, will give a fair view of the case to the psychiatrist when the patient is presented to him for further observation.

We now have to consider the symptoms that are liable to need our attention, and find that insomnia is one of the most frequent conditions to combat, as it is almost invariably present and persistent in manic depressive insanity. These patients must be placed in bed, if possible, in a separate room or compartment, where there is little noise or commotion, as absolute rest is very essential. Cold packs are frequently of value in excitements, but not as efficient as the continuous bath.

Should it become necessary to use hypnotics to allay the excitement, whether it be of the manic depressive, paretic, dementia præcox or other type, the writer is of the opinion that hyoscine hydrobromate is the most useful drug, as it is easily given and the results are almost immediate. It can be administered hypodermically in a dose of $\frac{1}{75}$ to $\frac{1}{100}$ grain, repeated in 20 minutes to one-half hour if necessary; it is realized that many observers are much opposed to the use of this drug, and it certainly is contraindicated in patients with cardiac lesions. However, the excellent results obtained give license for its use in greatly excited cases where no organic disease is present; it may be mentioned here that hyoscine is also used with some success in the treatment of acute alcoholic delirium, given

hypodermically in the dose of $\frac{1}{100}$ grain combined with strychnine $\frac{1}{30}$ grain and apomorphine $\frac{1}{12}$ grain.

Chloral hydrate is our next best hypnotic, but it has the disadvantage of being difficult to administer to greatly disturbed patients, as they often refuse to swallow. This may be overcome by holding the patient's nose firmly so that he must breathe through the mouth, with the head held backward and the mouth forced open; the solution is slowly poured into the mouth from a feeding cup, then making sure that the medicine has been swallowed before the patient is released. Chloral is given in the dose of 15 to 40 grains, but, like hyoscine, is contraindicated in cases with cardiac lesions.

The bromides are next in importance and are certainly more safe than chloral. They should be given in doses sufficiently large to obtain results, namely, from 40 to 100 (or more) grains. Sulphonal and trional are more useful as hypnotics in the treatment of depressions than in excitements; either may be given in 15 to 45 grain doses about 7 p. m. in powder or dissolved in hot milk. Opium and its preparations have the least value in the treatment of insomnia, as there is always the danger of forming the habit, and there is the added disadvantage of locking up secretions.

Codeine is believed to be of value in lessening the mental unrest in depressive types. In these instances it is given in one-half to one grain doses three times daily. There are numerous proprietary preparations that are entitled to some reputation as hypnotics, but as they are not supplied by the department and have little advantage over those mentioned, it is unnecessary to refer to them.

While the patient with suicidal tendencies is a constant source of anxiety to a medical officer of a hospital for the insane, that anxiety is increased tenfold with the medical officer of the Navy, as he must leave his patient in the care of men untrained in handling the insane, and often in quarters that are not desirable for such cases; the latter is particularly true on board ships, where it is frequently necessary to place such patients in the brig for safe-keeping.

The only resource we have in the treatment of suicidal cases is continuous watching day and night; the hospital corpsmen must be instructed never to allow the patient out of their sight for a minute. It should be explained that the patient has a tendency to self-destruction and even being 15 feet from the patient is dangerous. In my experience two patients have succeeded in eluding their attendants. Case 1: On waking in the morning the attendant was asked to step to the door and call for a glass of water, and while the nurse was so engaged the patient picked up a small table, sent it through a window, and jumped after it, sustaining a severe concus-

sion and a fractured clavicle. Case 2: The hospital apprentice stepped to the far side of the sick bay to make some notes on the case. The patient, taking advantage of his momentary absence, crawled through a porthole and was drowned. In both instances the attendants were not more than 20 feet distant from the patient. This points out the importance of instructing hospital corpsmen in the absolute necessity of remaining at the patient's side at all times and even have help close by, as the desire to destroy themselves is sometimes so intense that these patients fight like demons to attain this end.

Suicidal cases should always be kept in bed, except for a few hours daily which can be devoted to outdoor exercises; during this time at least two hospital corpsmen should accompany the patient, and they must be physically capable of handling the case in event of an emergency. While the patient is absent, his room can be thoroughly searched for knives, forks, pieces of glass, or instruments that might be used for self-destruction. Sheets, pillowcases, blankets, and towels must be counted and an immediate search made if there are any missing or if pieces have been torn off, as patients have saved small strips of sheeting for the purpose of weaving a rope, thus giving them the desired implement for hanging. The food of these patients must be served on metal dishes; knives and forks, as well as glass and crockery, must be eliminated from the service and foods so prepared that the patient may either feed himself or be fed with a spoon. It may be well to mention at this point that mouth temperatures should not be taken in this class of cases.

As suicidal tendencies develop from different underlying causes—such as auditory hallucinations, the patient hearing a voice telling him to destroy himself; from sudden impulse; from the desire to relieve himself of dreadful mental pain, or from the fear of some punishment or disease—data should be obtained to form part of the history of the case.

While the treatment of patients having homicidal tendencies is practically the same as of those attempting self-destruction, we find this element in a different class of cases: The mental disease that most frequently presents suicidal tendencies is the depressive phase of manic depressive insanity, whereas homicide is more common in paranoia, chronic alcoholism, associated with hallucinations, epileptic insanity, and dementia praecox; in the latter disease the assault is frequently due to a sudden impulse, while in the first two conditions it is usually due to hallucinatory commands.

One of the most troublesome conditions that confronts the physician treating mental diseases is the refusal of food on the part of the patient. This is frequently due to a desire to starve to death or fear that the food has been poisoned; it is also common in catatonia

and negativism. While certain robust patients may be allowed to go from several days to a week without food, in others it is necessary to resort to forced or tube feeding immediately.

The food usually prepared for these patients consists of a mixture of milk, malted milk, and raw eggs; medication may be added if it is deemed necessary, and the entire mixture heated to a temperature of about 100° F. The utensils needed are a funnel, stomach tube, a pitcher containing the prepared food, vaseline, a pan to receive the tube after the feeding has been completed, and, in the case of mouth feeding, a gag; the latter should be made of very tough and hard wood, to avoid splintering; wedge shaped, about 6 inches long and 1 to 1¼ inches wide. As tube feeding is somewhat dangerous, owing to the liability of the tube passing into the larynx instead of the oesophagus, it should always be done by or in the presence of a medical officer. The writer prefers feeding through the nose, as patients are less liable to gag; their verbal protestations will indicate that the tube has not entered the larynx, and there is less danger of breaking or loosening teeth. The disadvantages are, first, a smaller tube must be used and therefore it is more liable to become clogged; second, tube feeding carried on over a long period causes irritation of the nasal mucosa.

The technique is as follows: All preparation having been made, the patient is seated in a chair and is covered with a sheet. A nurse, who is seated directly behind him, grasps the patient around the waist in such a manner that the arms are included and held close to the sides, the legs being allowed to go free. Another attendant holds the head, and the operator standing on one side lubricates the stomach tube to which the funnel has been attached, passes it through that side of the nose that seems to be the largest, and gently forces it into the stomach, using the same precautions as for ordinary lavage. The prepared food is now poured in the funnel and allowed to flow slowly into the stomach. The tube is then withdrawn somewhat rapidly. Feeding by mouth is similar to the above operation, except the teeth are forced apart with the wooden wedge, this being left in place during the entire operation.

The refusal of food is much more common in the treatment of women than men, and frequently male patients can be induced to take food after passing through the disagreeable experience of being tube fed several times. This is not the case, however, in catatonic types and forms showing negativism.

The following suggestions are made with the hope that they may be of value in the improvement of service conditions and that those persons becoming mentally alienated may be kept in our own hospitals a sufficient period of time for observation, in order that we may satisfy ourselves beyond doubt that the patient is insane. It is a grave

injustice for a man to be surveyed to the Government Hospital for the Insane only to find that he is not insane, or that he recovers from a very slight and temporary mental derangement shortly after his arrival, as the stigma attached to persons having been inmates of such institutions often deprives them of what might otherwise be theirs.

Primarily we must have constructed at several of our hospitals a special pavilion for the reception of these cases. It would be advisable to have these additions at Boston, Washington, Mare Island, and Cañacao, in order that all persons of the naval service becoming insane at Newport, Portsmouth (N. H.), and Chicago can be immediately transferred to Boston; those from New York, Philadelphia, Annapolis, Norfolk, Charleston, and Port Royal could be gathered at Washington; Mare Island acting as the receiving ward for Puget Sound, Samoa, and Las Animas, and Cañacao receiving insane patients from Guam and the remainder of the Asiatic station.

It is advisable, from an economical standpoint, to have these pavilions attached to the main hospital building by a covered passageway; otherwise it would be necessary to have separate kitchens, cooks, etc.; they must be built especially for the purpose, having soundproof walls and partitions. Each pavilion should contain from six to eight rooms for patients, a bathroom, and a room for an extra hospital corpsman. Patients' rooms are to be 8 by 12 by 12 feet each, having one window opening on the side of the pavilion, away from the main hospital, and on a part of the hospital grounds that is seldom used by other patients for recreation. All rooms should open from a common hall, the windows of this hall to open toward the main hospital buildings; the bathroom to be at one end of the hall and the Hospital Corps room at the other; window openings of the entire pavilion to be protected on the outside by an iron grate of some sort, the windows to be made of a number of plate glass panes 8 by 8 inches and one-half inch in thickness; these to be set in a specially constructed, heavy wood frame, and so made that they can not be raised or lowered except by releasing a friction lock, the key of which must be kept by the hospital corpsman. The doors to be of plain heavy wood about 2 inches thick, opening into the room, and having no knob or keyhole on the inner side, but to be fitted with a glass port so that the patient may be observed without entering the room. These rooms are to be ventilated by a supply opening near the floor, the opening being protected by heavy wire mesh, so fitted that it can be removed for cleansing purposes, and an outlet located near the ceiling; the rooms to have no lights, as all artificial light that is necessary can be supplied with a portable electric lantern.

The patient's room should be finished with all corners and angles rounded; the ceiling and walls to be painted to withstand thorough and frequent washings; the floor to be made of one of the newer

compositions similar to cement and inclined in order that water will flow to the outer border and pass through a covered drain; a series of bolts, about 1 foot apart, should be embedded in this floor material, extending around the entire edge of the room, in order that a canvas carpet may be laid without danger of its being destroyed or removed by the patient; and, further, there should be sockets to receive the feet of the bed, so that it may be held stationary.

No moldings or fixtures of any description are to be used in the patients' rooms, and the bed, which is so placed that the attendants can easily pass around all sides of it, should be the only piece of furniture; at least one room should be left without a bed for the reception of greatly excited cases.

The hall and bathroom is to be lighted by a cluster overhead and by side brackets, all to be protected by heavy iron guards similar to those used on the battle circuit aboard ship, the entire lighting system to be controlled from a wall switch closet, which is to be kept locked.

The bathroom should be divided into three compartments, one to be used for ordinary bathing and fitted with a shower only, the second to be used as a lavatory, and the third to contain a large tub for continuous bathing. This tub is made considerably larger than ordinary bathtubs, and is fitted with metal buttons around the outside, in order that a canvas sling can be attached in such a manner that the patient is suspended in the water from 6 to 9 inches above the bottom of the tub. As part of the bathing system the bathroom should contain a water mixer, on the face of which is a thermometer, indicating the temperature of the water as it leaves the mixer, and the entire water system must be controlled by detachable keys.

It would be advisable to have the passageway leading from the main hospital to the psychopathic ward guarded by a heavy door at either end; these would allow the use of this space for exercising the milder cases in bad weather. Part of the hospital grounds immediately adjacent to the psychopathic pavilion should be fenced in, giving an adequate outdoor recreation space for these patients.

We can not consider our work complete with the construction of a suitable place for the reception of insane patients, as we have not competent nurses to look after them, therefore we must instruct members of the Hospital Corps in the proper care of such cases, and this instruction should form a part of the regular course of teaching.

Primarily, only men of excellent physique and whose reliability is beyond question should be selected for this work. The course of instruction to be followed is outlined below:

The responsibilities of the work are to be explained, pointing out that the patients they will have to care for are not responsible for their words and actions and that any violence on the part of a man nursing such cases, except in self-defense, is not only cowardly but

contradictory to the profession they follow. The care of keys and keeping doors locked to prevent the escape of patients is second only to violence, as runaway insane patients may commit suicide, homicide, or die from exposure, so let us begin our course of instruction with—

(1) Violence to the patient, except in self-defense, will not be tolerated, and where a patient is known to be very violent an extra hospital corpsman shall be on hand when the patient's room is entered, in order to assist and prevent undue injury to the patient.

(2) Master keys opening all doors of the psychopathic department shall be carried by hospital corpsmen on duty and are to be firmly attached to the trousers by a heavy key ring and chain; the keys for windows, water and electric light control cabinet shall be kept in the Hospital Corps room; the doors at both ends of the passageway are to be kept locked at all times, also the doors opening into the bathroom, Hospital Corps room, and unoccupied patients' rooms; patients under no circumstances should be allowed to enter the Hospital Corps room, even for a moment, as they are liable to snatch articles that might be used for assault, and, though the culprit may be apprehended immediately, there always remains the struggle to regain possession of the article.

(3) Accurate accounts of all incidents occurring in the ward shall be noted, no matter how slight, including the time meals are served, the amount taken by each patient, when patients are allowed out of their rooms, stating time of unlocking and locking doors, the amount of outdoor exercise taken, bowel movements, baths, medication, comments of patients, and special notes when restraint has been used, including exact length of time.

(4) Report any sudden change in a patient by telephone to the officer of the day; also inform him of any injuries, including slight scratches, as these patients are very prone to infection. Never under any circumstances place a patient in restraint unless this officer is informed. Should a patient who has been quiet and orderly suddenly become violent, confine him in his room and inform the office of the action.

(5) It is seldom necessary in properly equipped hospitals with well-trained attendants to use restraint jackets, but in the naval service they must be used very frequently, as we travel with our patients on trains or we are compelled to use restraint on board ship; therefore we must include in our course of instruction a description of these jackets and the manner of putting them on. A very simple, as well as effective, jacket can be made of No. 7 Navy canvas, having the body of the jacket extend from the neck to the waist and lace up the back. The sleeves are made without an opening for the hand, and about 2 inches beyond where the tips of the fingers come they are closed entirely and the canvas is extended into a band about 2 yards

long and 2½ inches wide. The jacket is slipped on the patient and laced up the back. The arms are then folded. Drawing the long-tail end of the sleeve of the right hand under the left arm, it is carried across the back to the right side, passing between the right arm and chest, then across the front of the right arm, about the middle, and around to the back again, where it is to be tied with its fellow of the opposite side that has been passed in a similar manner but in the opposite direction.

(6) There should be at least 2 hospital corpsmen on duty during the day and 1 at night, with a reserve man prepared to be called upon sleeping in the Hospital Corps room. Under no circumstances should hospital corpsmen on duty leave the ward without being relieved, and requests for medicines or other things are to be telephoned to the main building. The visiting of hospital corpsmen or of other patients should be prohibited, and only near relatives of the patient should be admitted as visitors. The ward must be kept as quiet as possible at all times.

(7) All patients must be given a cleansing bath at least twice a week, and the hospital corpsmen must be present at all times with patients while bathing or in the bathroom. Under no circumstances will the patient be allowed the possession of control water keys. Patients on admission should be stripped, given a bath, placed in bed, and a purge administered. If very destructive, a union suit of canvas made to lace up the back can be used, otherwise he will be given pajamas. The shoes of all patients are to be kept in a closet, and only when patients are taken out for exercise shall they be allowed to wear them. Mess gear entering and returning from the psychopathic ward shall be accounted for and a report made to the chief nurse upon the completion of each meal, whether or no there are any missing pieces.

(8) No drugs or chemicals of any description are to be kept in the psychopathic ward. When medication is ordered, the single dose that is prescribed is to be sent from the main hospital and administered in the presence of the hospital corpsman. Soiled linen is so be returned to the linen room each day and clean linen received in its place. Mattresses are to be covered with rubber sheeting and bedpans or metal chambers to be used in most instances. Patients using the toilet must be closely watched.

(9) As the insane are very prone to masturbation, sodomy, and other sexual perversions, a strict watch must be kept in order that two or more patients do not have the opportunity of committing these offenses. Patients with filthy habits, such as smearing fecal matter over the floors and walls of their rooms, may be given an enema once or twice daily and watched until the desired effect has been produced. Then remove the bedpan immediately.

(10) All except suicidal patients should be locked in their rooms at night. Suicidal cases are to be left with their doors open and frequent observations of these patients shall be made by the hospital corpsmen on duty.

(11) The temperature of rooms for the treatment of the insane must be kept fairly high, as these patients are much below normal in vitality and are therefore very susceptible to colds, pneumonia, and like diseases.

(12) One of the most valuable assets we have in modern psychotherapy is the continued bath for the treatment of excitements. To give this bath, the tub previously mentioned is filled with water to the overflow point. The patient's body is then smeared with vaseline and he is placed on the canvas sling in the reclining position, the water covering the entire body up to the chin. The bath is continued for several hours; some patients, however, are so much benefited by this treatment that they are allowed to remain in the tub for several days or a week. Greatly excited cases may fight and splash about, but they usually quiet down in a short time and often sleep while under the treatment. Of course, it is necessary to have a hospital corpsman in constant attendance. The temperature of the water should be about 70° F., and it is kept at this temperature by adjusting a constant flow from the water mixer.

In concluding this outline of instruction I might say that persons who are caring for the insane, if interested in their work, soon become able to anticipate the actions of their patients and, from a change of mental attitude, will divine their intentions while they are being formulated. In this way clever attendants are often able to prevent catastrophies. Some of my readers may think the course suggested too elaborate to justify its adoption in the service, but when we review the statistics of the Navy for the preceding year and find that there were about 150 cases of insanity, not including 22 suicides, a fair percentage of which it is reasonable to assume were mentally deranged, they will agree with me that the number is sufficiently large to warrant the expenditure of time and money in order that these unfortunates may be given the same chance of treatment and recovery that the surgical case enjoys.

INTESTINAL PARASITES AND DISEASES FOUND IN GUAM.

By C. P. Kindleberger, Surgeon, United States Navy.

Guam, the largest and most important of the group known as the Marianas Islands, was ceded to the United States at the close of the Spanish-American War. The island is located about 1,200 miles east of the Philippines and has an area of 206 square miles. On June 30, 1912, the total native population was 12,139.

A careful search of the past and present records of stool examinations reveals the fact that practically every native adult, all native children over 2 years of age, and some as young as 6 months, are infected with one or more intestinal parasites.

From September 1, 1906, to July 1, 1912, the laboratory books show 7,668 first examinations and 3,691 second examinations of native stools. The records of these examinations are appended below as Tables No. 1 and No. 2. All first examinations were positive, about 70 per cent of the stools contained ova of hookworms, ascarides, and whipworms, and the remainder the ova or embryos of from one to six parasites. After internal treatment, lasting usually from 12 to 14 days, the second examinations gave the following results: Two thousand nine hundred and twenty-four were positive, from one to five parasites being found in each specimen, and 767 were pronounced negative after the examination of one slide.

This almost universal worm infection is due, first, to general soil pollution, and, second, to the fact that nearly 60 per cent of the natives are very dirty in their habits, bathe infrequently, practically never clean their finger nails nor wash their faces and hands before eating, have only a few cooking utensils, are careless about drinking water and the preparation of food, usually eat with their fingers from a common dish, and are frequently inveterate chewers of betel nut.

Samples of soil from under houses in Agaña and the smaller towns, also dirt from the inside of Agaña houses and dirt from the finger nails of Agaña children, were mixed with salt solution and carefully examined. After a number of slides had been looked over all the samples except one were found to be positive for the ova or embryos of from one to three intestinal parasites. A summary of these examinations is shown in Table No. 3 at the end of the article.

Children playing in the dirt not only constantly reinfect themselves, but frequently, when not watched, contaminate the soil with urine and feces. Most of the natives in Agaña use the pail type of closet and only a few houses have so far been connected with the new sewage system.

In the smaller towns the natives generally attend to the calls of nature on the beach or in the woods back of their houses. Only a few have any form of closet and only those near the public latrines use them.

To remedy this condition it was considered advisable to instruct the school children in general personal hygiene, and through them their parents and relatives. In accordance with this plan an elementary course in hygiene was prepared, approved August 4, 1911, and is now a part of the instruction given in all the island public schools.

Besides the above, as rapidly as the island finances permit, the smaller towns are being provided with waterworks, public shower baths, and latrines, and "rock-pile" incinerators for garbage and refuse.

The Agaña children from 2 to 12 years old and all children of school age (6 to 12) from the smaller towns have been admitted to the hospital twice during the last fiscal year and given from 12 to 14 days' treatment for intestinal parasites.

Worm treatment is also given at the native clinic, and the stools of all patients admitted to the hospital are examined, and if any parasites are found appropriate treatment is ordered.

Up to the present time the following intestinal parasites have been discovered:

1. Agchylostoma duodenale Dubini 1843.
2. Necator americanus Stiles 1902.
3. Ascaris lumbricoides Linnaeus 1758.
4. Trichuris trichiura Linnaeus 1771.
5. Entamœba hystolitica Schaudinn 1903.
6. Entamœba coli Lösch 1875 (?).
7. Balantidium coli Malmsten 1857.
8. Strongyloides stercoralis Bavay 1876.
9. Flagellates, probably Trichomonas hominis Davaine 1854.
10. Oxyuris vermicularis Linnaeus 1767.
11. Vorticellæ.

NOTE.—Tapeworms have not been found.

AGCHYLOSTOMIASIS.

Both the ova and full-grown parasites of *Agchylostoma duodenale* Dubini 1843 and *Necator americanus* Stiles 1902 have been found in about 78 per cent of all first examinations of native stools.

Children admitted to the hospital for worm treatment are given a dose of calomel and santonin appropriate to their age and physical condition. Early the next morning the patients take Epsom salts, and later have a breakfast of coffee and crackers. A specimen of stool is then sent to the laboratory for examination. At 4 p. m. the same day, if hookworm ova are found, thymol is given in capsules and the children are immediately put to bed. On thymol days they do not have any lunch or dinner, but are allowed to drink all the water they want. At 6 a. m. on the third morning salts are taken, and at 10 a. m. a dose of santonin is given. A full diet, consisting of morning coffee, bread, meat, and rice, is allowed on the santonin days. The principle of the treatment is thymol and starvation every other day and santonin and a full diet on the alternate days. To avoid the possibility of thymol poisoning, no visitors are allowed to see the

children on the days when this medicine is administered. So far there have been no true cases of poisoning, only an occasional gastro-enteritis. The results of this treatment have been most encouraging, as the little patients are noticeably less anemic, brighter, stronger, and more playful. Before the children leave the hospital the stools are again examined and the results recorded.

Adult hookworm patients are allowed a light luncheon, but no dinner. At 8 p. m. 1 to 3 grams of thymol are given in capsules, and a similar dose at 9 p. m. Before breakfast the next morning 30 to 45 grams of salts are given. If the patients also have ascarides, 0.3 gram of santonin is prescribed on alternate days, followed the next morning by Epsom salts. One case (sergeant, U. S. M. C.), who has proved resistant to repeated treatments with thymol, was given three 2-gram doses of betanaphthol, two hours apart, preceded and followed by magnesium sulphate grams 25, without apparent benefit.

ASCARIASIS.

Nearly 92 per cent of the native stools examined contained the ova of *Ascaris lumbricoides* Linnaeus 1758. Post-mortem, hundreds of adult ascarides are usually found in the small intestine, the colon, and occasionally in the stomach; in one case the appendix was tightly packed with them. Colicky abdominal pain and indigestion are the usual symptoms noted. It is believed that the anemia and toxemia caused by ascarides and other parasites are the principal causes of the epidemic asthma (guha) formerly so prevalent among the inhabitants of this island and usually so fatal in young children. This disease is apparently lessening since the general worm treatment was started. A full dose of calomel and santonin at bedtime, with Epsom salts the following morning, repeating the santonin and salts at least five times, will usually cure the patient, provided reinfection does not take place.

TRICHURIASIS.

The *Trichuris trichiura* Linnaeus 1771 was found in almost 96 per cent of all native stools examined. This parasite has proved to be most resistant to treatment, as its ova can generally be found after 12 to 14 days' vigorous anthelminthic treatment, even if the stools are negative for the ova or embryos of other intestinal parasites. In several post-mortems enormous numbers of these worms were found firmly attached to the mucous membrane of the large intestine, and they are considered to be at least partly responsible for the anemia, gastrointestinal, and nervous symptoms usually attributed only to infection with ascarides and hookworms. The

routine treatment is the same as that prescribed for hookworms. Enemata of solutions of benzine, as recommended by Castellani and Chalmers, has not been tried as yet.

AMEBIASIS.

Amebic dysentery is fairly common and is frequently fatal in infants and young children unless they are promptly brought to the hospital for treatment. The *Entamoeba hystolitica* Schaudinn 1903 is always found in these cases. A smaller ameba, with less refractile endoplasm, finer granules, fewer vacuoles, and lessened amoeboid movements, believed to be the *Entamoeba coli* Lösch 1875, is found in many cases not showing symptoms of true dysentery. The routine treatment, which has proved effective in adults, is rest in bed on a soft diet, high colon irrigations with quinine or thymol solutions, and at night opium, followed by full doses of ipecac in the form of salol-coated pills. Children are given irrigations and smaller doses of the same drugs, with the exception that the opium is omitted if possible. The above treatment has also been able to abort three cases of incipient liver abscess, whose symptoms were enlarged and tender liver, pain in the right epigastric region, high, irregular fever, and a leucocytosis with marked increase of the polymorphonuclears. In two of these cases the liver symptoms complicated a severe attack of amebic dysentery. The other case gave a history of two previous dysenteric attacks, but on admission his stools were free from amebæ.

BALANTIDIUM COLI.

Balantidium coli Malmsten 1857.—This parasite of the large intestine, though not very common, has always been found in association with three or four other parasites. The symptoms resemble those of dysentery; the stools contain mucus, are frequent, offensive, and reddish-brown in color from the presence of broken-down red corpuscles. Colon irrigations of 1 to 1,000 quinine solution and syrup ferri iodidi and strychnine sulphate, internally, has been the usual treatment ordered. One fatal case of infection with this parasite, a girl 9 years old, occurred June 6, 1911. Autopsy showed the large intestine to be ulcerated and loaded with thousands of balantidia.

STRONGYLOIDOSIS.

The rhabdite embryos of *Strongyloides stercoralis* Bavay 1876 are frequently found in native stools, with the ova or embryos of from 1 to 4 other parasites. Owing to the above-mentioned facts, no special symptoms referable to this parasite have been noted. Routine hook-

worm treatment has given good results and has caused the parasite to disappear from the stools.

FLAGELLATES.

Flagellates, probably *Trichomonas hominis* Davaine 1854, are fairly common. They are never found alone in the stools, from 2 to 5 other parasites always being present in the same specimen. Owing to the number of worms usually found in the stools, it has not been possible to separate the symptoms due to infection with flagellates from those caused by the others. Treatment ordered for hookworms and ascarides appears to be equally effective in ridding the patient of these parasites.

OXYURIASIS.

Infection with *Oxyuris vermicularis* Linnaeus 1767 is apparently extremely rare. In the two cases found, both children, the ova and adult parasites were discovered in stools which also contained the ova of three others. Besides the routine worm treatment, quassia infusion was given by mouth, the hands were rinsed in this infusion at intervals, and rectal injections of quassia infusion were ordered.

VORTICELLAE.

These infusoria have only been found in a few stools and are apparently nonpathogenic.

ENTEROCOLITIS.

Enterocolitis, principally due to faulty feeding and indigestible food, is frequent, and was responsible for 23 deaths during the last fiscal year. Neither Shiga's bacillus nor any other causative organism has been found in these cases.

TABLE No. 1.—*First examinations of native stools, Sept. 1, 1906, to July 1, 1912.*

Total number examined and found positive	7,668
Hooks, ascarides, whips, amebæ, strongyloides, and flagellates	1
Hooks, ascarides, whips, amebæ, cercomonas, and flagellates	2
Hooks, ascarides, whips, strongyloides, flagellates, vorticellae	1
Hooks, ascarides, whips, strongyloides, and cercomonas	3
Hooks, ascarides, whips, amebæ, and balantidia	1
Hooks, ascarides, whips, amebæ, and cercomonas	10
Hooks, ascarides, whips, balantidia, and flagellates	1
Hooks, ascarides, whips, balantidia, and strongyloides	2
Hooks, ascarides, whips, amebæ, and strongyloids	1
Hooks, ascarides, whips, amebæ, and flagellates	3
Hooks, ascarides, whips, flagellates, and vorticellae	1
Hooks, ascarides, whips, and amoebae	23

Hooks, ascarides, whips, and strongyloides	112
Hooks, ascarides, whips, and oxyuris	2
Hooks, ascarides, whips, and balantidia	21
Hooks, ascarides, whips, and flagellates	20
Hooks, ascarides, whips, and cercomonas	46
Hooks, ascarides, whips, and vorticellae	2
Hooks, ascarides, strongyloides, and cercomonas	1
Hooks, whips, amebæ, and cercomonas	3
Ascarides, whips, amebæ, and cercomonas	1
Hooks, ascarides, and whips	5,278
Hooks, whips, and amebæ	3
Hooks, whips, and strongyloides	11
Hooks, whips, and cercomonas	12
Ascarides, whips, and strongyloides	12
Ascarides, amebæ, and cercomonas	2
Ascarides, whips, and amebæ	5
Ascarides, whips, and balantidia	2
Ascarides, whips, and cercomonas	10
Ascarides, whips, and flagellates	1
Hooks and ascarides	108
Hooks and whips	272
Ascarides and whips	1,143
Ascarides and cercomonas	1
Ascarides	190
Whips	348
Amebæ	7
Cercomonas	6
Total	7,668

TABLE No. 2.—*Second examinations of native stools, July 1, 1911, to July 1, 1912.*

Found positive	2,924
Found negative after examination of one slide	767
Total	3,691
Hooks, ascarides, whips, amoebae, and balantidia	1
Hooks, ascarides, whips, balantidia, and strongyloides	3
Hooks, ascarides, whips, and balantidia	7
Hooks, ascarides, whips, and strongyloides	18
Hooks, ascarides, whips, and vorticellae	1
Ascarides, whips, amoebae, and flagellates	1
Ascarides, whips, and hooks	487
Ascarides, whips, and strongyloides	2
Ascarides, whips, and flagellates	1
Hooks, whips, and strongyloides	12
Hooks and whips	394
Ascarides and whips	734
Whips and strongyloides	1
Hooks	7
Ascarides	163
Whips	1,092
Total	2,924

TABLE No. 3.—*Dirt examinations.*

Six samples of dirt from under native houses in Agaña were examined April 15, 1912, and found to be infected with ova of the following intestinal parasites.

District of Santa Cruz.—Ascarides and whips.

District of San Ygnacio.—Hooks, ascarides, and whips.

District of San Nicolas (two samples).—(1) Whips, (2) strongyloides (embryos).

District of San Antonio.—Hooks and whips.

District of San Ramon.—Ascarides and flagellates.

On May 20, 1912, samples of dirt from under native houses in the towns listed below were examined for ova of intestinal parasites, and the following results noted:

Ynarajan.—Whips.

Agat.—Ascarides.

Merizo.—Ascarides and whips.

Umatac.—Whips.

Piti.—Whips.

Asan.—Hooks and whips.

Sumay.—Negative.

Dirt examined from floor of native houses in Agaña:

First sample.—Ascarides and whips.

Second sample.—Hooks, ascarides, and whips.

Third sample.—Hooks and ascarides.

Dirt examined from finger nails of Agaña children:

First sample.—Negative.

Second sample.—Ascarides.

Third sample.—Hooks and whips.

THE CLINICAL MANIFESTATIONS OF PITYRIASIS ROSEA.

By W. D. OWENS, Passed Assistant Surgeon, United States Navy.

The personnel of a naval training station affords an excellent field for the observation of the more acute affections of the skin. During the past year I have had the opportunity of studying 26 cases of pityriasis rosea, a disease which the uniformity of opinion classifies as of infrequent occurrence.

Jackson states that " the disease is but little known in this country, not because it does not occur, but because it is not recognized." Fiocco found it in 1.27 per cent in Breda's clinic and polyclinic. Crocker's cases occurred but 1 in 250 skin diseases observed. Weiss places the frequency as high as between 5 and 12 per cent of all skin affections applying for treatment. Hyde reports seeing 87 cases in 18 months. When one considers that the affection seldom, if ever, causes distressing symptoms, it is probable that a considerable proportion of the cases fail to present themselves for treatment. Thus, one-half of my cases are noted as of unknown existence.

Weekly body inspections of the apprentice seamen was the manner of establishing the presence of such eruptions.

In recording this series of cases I have endeavored to establish the character of the lesions, their distribution, the presence of the "primitive plaque," the signs of accompanying constitutional disturbances, the occurrence of itching, the comparative frequency in blonds and brunettes, the months of most prevalent occurrence, and to indicate the diseases with which one might most readily confuse pityriasis rosea. In 10 cases I have made frequent search for some form of fungus, and will present the result of my observations in regard to the etiology of the disease. In six instances I have recorded the blood findings.

The occurrence of small flat papules from which develop the young macules are the first manifestations of the eruption of pityriasis rosea. The early macular lesions consist of a varying number of round or oval slightly raised, salmon-colored spots, exhibiting fine, dry furfuraceous scales. Almost invariably the efflorescences are discrete, but in rare instances they are confluent. Not uncommonly the lesions are guttate or punctate, less frequently nummular or serpiginous. As the macular efflorescence advances it oftentimes becomes annular or circinate in character, presenting an outer scaling ring of pinkish color, while the center becomes shriveled, having the appearance of washed leather. Within the ring the scales are attached by the end toward the sound skin while the end toward the center of the lesion is free. The circinate forms are scattered irregularly among the more numerous macules. They are larger than the macular form of the eruption and are more often oval or elongated than round. Fox in a recent paper upon pityriasis rosea states that the circinate lesions may become confluent and extensive marginate patches result, manifesting a predilection for the axilla and groin. Figure 4 is an excellent illustration of such a patch, which developed from two circinate lesions in the axilla. It is not unlike the clinical picture of Hebra's eczema marginatum.

Gilbert in his pioneer description of the disease that bears his name, written in 1860, indicates the distribution of the eruption as follows:

> Spreading on the upper portion of the body, especially the neck, chest, and upper portion of the arms, and extending in succession downward to the thighs so that the total duration of the eruption, which disappears gradually from the parts first affected, while extending downward, generally lasts six to eight weeks.

Thibierge mentions a superior cervical localization, which never extends beyond the submaxillary region. Fox records a case presenting "elongated lesions on the neck, typical medallions on the shoulder, and a fading 'primitive plaque' on the cheek just above the angle of

the jaw." Towle in his analysis records a similar case. Stelwagon states that the disease seldom attacks the face. Towle mentions the presence of lesions on the scalp in one instance. Fiocco reports one case which involved both hands and feet.

The regions of the body most often involved by the lesions in my observations corresponded with the areas of predilection as recorded by Gilbert in his classical description. I have generally found that the early lesions first appeared upon the abdomen. This knowledge was so strongly impressed upon me that passing down the rows of men during body inspection I invariably sought the anterior belt region as the site one would examine to detect the young papular or macular eruption.

Brocq, in 1887, announced that preceding the general eruption there occurred a primary lesion, which he designated as the "plaque primitive." When present in my series it was noted as an elongated, oftentimes irregular, area, peripherally hyperemic with a sluggish buff-colored center. Brocq says "it may be found in the midst of the secondary eruption by its larger size." In my series it has been noted in eight cases—once upon the chest, once on the pubes, and in six instances it occupied an area upon the abdomen included by the left half of the epigastric region, the left half of the hypogastric region, the left lumbar and the left inguinal regions. Figure 4 shows the "plaque primitive" on the pubes, a locality not mentioned in the literature so far as I have been able to determine. The following sites have been recorded by different observers, over the scapula, upon the neck, the arms, or the thighs, upon the left sterno-mastoid region. Allen reports a case where it involved the whole chest wall. The uniformity of opinion is that its most frequent site is somewhere upon the trunk, which corresponds with Brocq's original contention.

The writings of different observers as to the presence of constitutional symptoms occurring in pityriasis rosea are as varied as they are numerous. Such excellent authorities as Jacque, Bouchard, Feuland, Weiss, and Crocker remark upon the frequent coincidence of pityriasis rosea and gastric disturbances, and there are equally competent authorities who fail to substantiate these findings. That systemic disturbances do occur in this disease most authors concede. It has been urged by those who consider the course of the disease not unlike syphilis, that constitutional symptoms do precede the general eruption, and at the time of examination are not evident. While interne at Providence Hospital I had my first experience with Gilbert's disease. The patient, a young man, developed a sharp attack of tonsillitis, accompanied by the usual symptoms. After three days in bed the attack subsided, and it was then that the presence of a disseminated macular eruption was noted. The

tonsillitis and its attending symptoms led to the diagnosis of syphilis. The patient refused to abide by this diagnosis for the excellent reason that there had been no exposure. Carmichael, of Washington, was consulted and readily diagnosed the affection as pityriasis rosea, which diagnosis proved to be correct. In my more recent study, examination elicited the presence of tonsillitis in nine cases and in three additional instances acute catarrhal inflammation of the upper air passages. When one considers that on account of the routine weekly examinations I have had the opportunity to study my cases from their incipiency, there may be more than mere coincidence to account for tonsillitis or catarrhal symptoms in over 42 per cent of my total series.

Gastric dilation as described by Feuland and several others was never observed. In none of my cases were there signs of gastric disturbances, nor was there an enlargement of the submaxillary glands as mentioned by Crocker. I have recorded the occurrence of itching in seven instances. Six are noted as "when overheated," and the remaining case complained of itching after his shower bath (fresh water).

The comparative frequency of its occurrence among blondes and brunettes in this series corresponds with the findings of Stelwagon, who states that it is found "less frequently in those of dark hair and complexion than in those of medium and blonde type." I have noted the appearance of the affection in 17 blondes and 9 brunettes.

In regard to the prevalence of the disease in certain seasons of the year I have recorded six cases occurring in October, four in January, one in April, two in May, one in June, none in July, two in August, and four in September. Thus from my figures it was found that the larger number of cases occurred in the autumn. This agrees with Towle's analysis of 202 cases. Gilbert found it more prevalent during the summer months, Bazin a more common affection of the spring, Fandler that it developed with the change of seasons, while Crocker and Fiocco regard it as being unaffected by the seasonal variations.

In determining the diagnosis between the early eruption of pityriasis rosea and the roseolar eruption of syphilis the greatest caution must be observed in order to avoid a grave error. I have already indicated one instance of mistaken diagnosis where there was no history of a primary lesion. With such a history the difficulties are more imminent. Figure 5 presents an eruption not unlike the incomplete classical description of Gilbert. The diagnosis in this case was wrongly changed from pityriasis rosea to syphilis and salvarsan administered.

Case 9. F. R., A. S., U. S. N., age 17 years, admitted November 16, 1912, stated that nine months previously had two venereal sores on

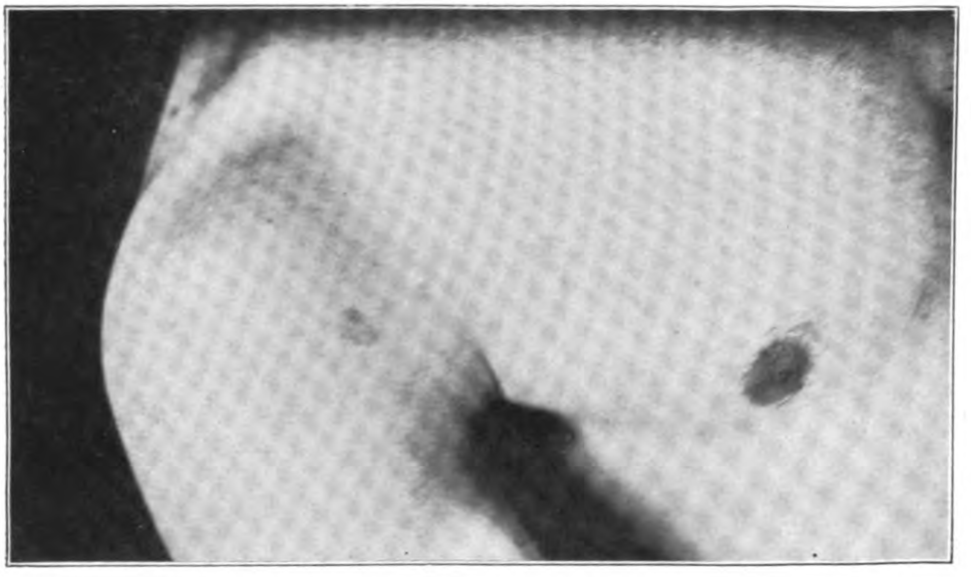


FIG. 1.—SHOWING THE MACULAR AND CIRCINATE FORMS OF THE LESIONS

FIG. 4.—SHOWING THE "PLAQUE PRIMITIVE" ON THE PUBES, A SITE NOT RECORDED BY ANY OTHER OBSERVER.

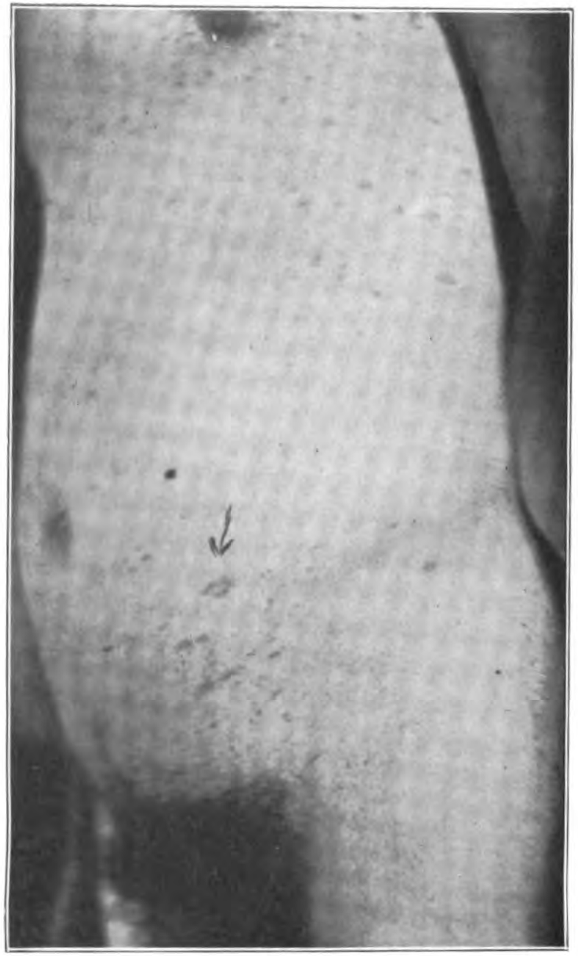


FIG. 3.—PITYRIASIS ROSEA OF THE ANNULO-MACULAR TYPE OF THE ERUPTION, SHOWING THE "PLAQUE PRIMITIVE" WITHIN THE AREA IN WHICH IT OCCURRED IN SIX INSTANCES OF MY TOTAL EIGHT CASES PRESENTING THIS PRIMARY LESION.

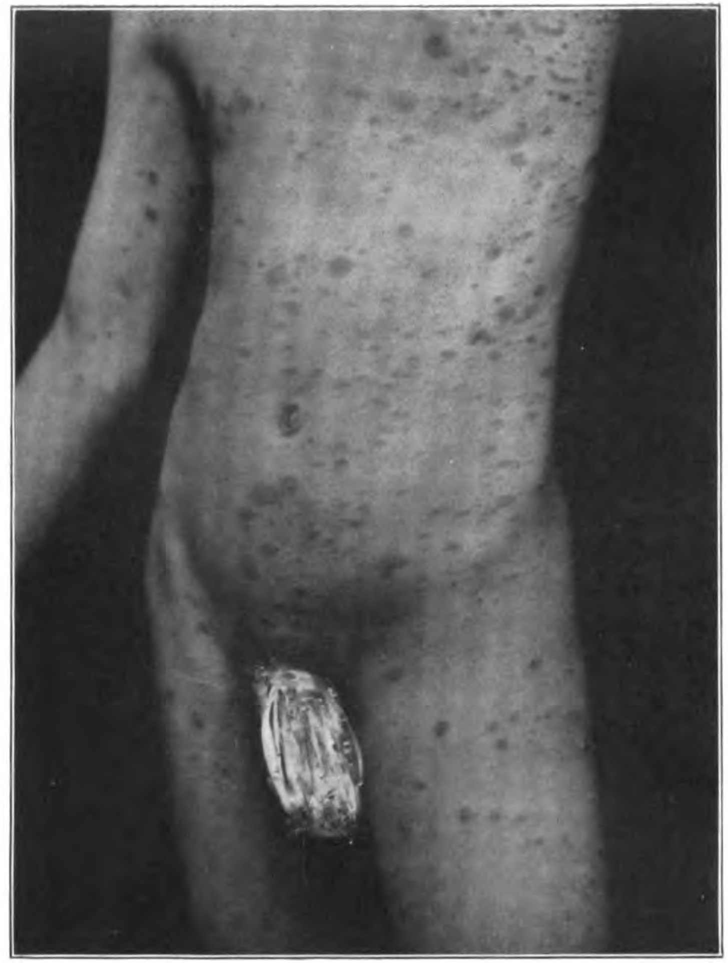


FIG. 5.—DISSEMINATED LESIONS WHICH CORRESPOND TO THE IMPERFECT CLASSICAL DESCRIPTION OF GILBERT. THE DIAGNOSIS IN THIS CASE WAS WRONGLY CHANGED FROM PITYRIASIS ROSEA TO SYPHILIS AND SALVARSAN ADMINISTERED.

(Photograph was taken five days after the intravenous injection of salvarsan.)

penis. July, 1911, hair began falling out and mercurial treatment prescribed. Patient is apparently free from any nervous tendencies and has recently (June 28, 1912) passed the examination required for a candidate for enlistment.

STATUS PRAESENS.—The eruption, which was first noted at body inspection, consists of a disseminated maculo-papular eruption involving the trunk, arms, and thighs. The lesions are typical. There are no constitutional symptoms. The presence of cervical and inguinal adenopathy is noted. Itching is not complained of.

There exist upon the scalp three circumscribed bald patches of six months' duration. There is no enlargement of the submaxillary glands. Urine examination was negative. Differential blood count shows a hypereosinophilia 7 per cent and a lymphocytosis of 45 per cent.

Luetin or Wassermann reactions were not made.

DIAGNOSIS.—Pityriasis rosea and alopecia areata.

Figure 5 shows the appearance of the eruption five days after the intravenous administration of salvarsan.

This is the second case of Gilbert's disease within the period of one year that I have known to receive salvarsan.

Between the lesions of seborrhea annulata and the lesions of pityriasis rosea when the eruption is confined to the chest, the diagnosis is almost impossible, unless the "primitive plaque" is present or a statement from an intelligent patient be accepted that it had been observed at some period during the two preceding weeks.

Weiss's sign, which he regards as pathognomonic, may be applied in difficult cases. It is described as follows:

> On scratching a recent not yet scaling patch with the finger nail, invariably some scaling can be produced in its center, which is more surprising, as there was apparently not the slightest indication of such.

The eruption of psoriasis may cause some confusion in differentiating its lesions from the efflorescenses of long-continued cases of Gilbert's disease. The lesions of psoriasis are more inflammatory in character, the scaling more profuse, and the lesions have more definite areas of predilection, being commonly located upon the scalp and the extensor surfaces of the knees and elbows, sites attacked in the rarest instances by the lesions of pityriasis rosea. Blaschko and Hollman consider the manner of the attachment of the scales in pityriasis rosea as an aid to differentiate the affection from psoriasis.

The various theories advanced in regard to the etiology of pityriasis rosea are confusing and uncertain.

In 1882 Widal announced the discovery of a parasite which he named the microsporon anomoen. Three years later Ferrari, in a paper upon the etiology of pityriasis rosea, confirmed the findings

of Widal. Kaposi has stated that he has observed a vigorous growth of mycelium in a patient, whom he exhibited before the Vienna Dermatological Society in 1889, and Neuman, at the same meeting, said that he was able to demonstrate the mycelium in such cases by soaking the scales in xylol.

In opposition to the views expressed by these few observers, there have been a vast number of competent authorities who have failed to demonstrate the presence of a fungus.

The fact that my series of cases have occurred among the personnel of a military organization, living in barracks, affords additional evidence to further substantiate the contentions of those observers who believe the disease possesses feeble contagious properties and who base their conclusions on the occurrence of more than one case in the same family, and the infrequent occurrence of small epidemics.

Fordyce has observed the disease in husband and wife and two sisters. Ziessler has noted the affection in husband and wife. Crocker saw two cases in the same family, and Fox in mother and child. In my series, three cases have occurred in the same company within the period of one month. I have endeavored to find some form of fungus in 10 cases, conducting frequent examinations of the lesions, during their different stages of advancement, but my efforts have been negative. I have carefully considered the ideas expressed by Lassar, Hutchinson, and Kromayer who regard the affection as incident to extraneous causes and incriminate unclean underclothes kept in poorly ventilated rooms. Such conditions do not exist at this station.

Buckley and Allen each report a case occurring among the attendants of a Turkish bath. This knowledge led me to investigate the shower baths, the daily use of which is required of all apprentice seamen. Salt-water soap is used with these showers and not uncommonly may produce a mild form of dermatitis in those having susceptible skins.

Three patients, each presenting an annulo-macular eruption, were selected and nonaffected areas of their trunks and extremities were subjected to a thorough lathering with salt-water soap for three consecutive days. At no time during or after the test did the skins show a tendency toward the formation of new lesions.

As the result of my studies and observations covered by this series of 26 cases. I am inclined to regard pityriasis rosea as an idiopathic erythematous disease possessing mild contagious properties. This study further convinces me that constitutional disturbances are in the nature of a coincidence and not a part of the symptom complex of the affection. The blood report as presented would tend to discourage the view that the affection is endogenous in character and

precipitated by the overproduction of bacterial toxins, as suggested by some writers. The blood findings in pityriasis rosea and blood findings of diseases of the skin in general are similar. Thus my counts indicate two important characteristics, an eosinophilia and a lymphocytosis. In two cases a marked increase in the large mononuclears was recorded.

	Case 1.	Case 2.	Case 3.	Case 4.	Case 5.	Case 6.
Polynuclears	48	42	30	36	39	43
Lymphocytes	38	44	58	54	49	45
Large mononuclears	2	6	3	5	2	1
Transitionals	3	2	2	1	3	2
Eosinophiles	7	5	6	4	6	7
Mast cells	2	1	2	6	1	2

The white counts were not below 5,600 nor greater than 8,200. The red cells were apparently normal. The haemoglobin tests are recorded from 91 to 100 per cent. In four instances the urine was examined, and the reports of the urinalysis were negative.

AN EASY METHOD FOR THE CULTIVATION OF THE GONOCOCCUS.

By G. F. CLARK, Passed Assistant Surgeon, United States Navy.

Various media have been suggested, but the following has been found to be the most satisfactory. Thalmann's medium, to which fresh human blood serum has been added, is used. A small amount of blood serum can be readily obtained, while ascitic fluid, hydrocele fluid, etc., can not always be had. Thalmann's medium is prepared as follows:

Five hundred grams of lean, finely minced beef are placed in 1,000 c. c. of distilled water and allowed to stand over night in an ice box. It is then filtered, and the filtrate made up to 1,000 c. c. with distilled water. To 100 c. c. of the beef juice add 1½ grams of agar, and boil for 15 minutes. Then add 2 grams of glucose, and bring the reaction to plus 0.6 by addition of $\frac{N}{1}$ NaOH. Tube, sterilize, slant, and incubate over night. No peptone or salt is required.

To each tube of the medium add 4 to 5 drops of fresh, sterile human blood serum.

After washing the glans penis with alcohol, and wiping off any secretion at the meatus, a drop or two of the pus is expressed from the meatus and inoculated upon the medium. It is best to incline the test-tube prior to inoculation, so that the serum will flow over the entire surface. The pus should be evenly spread. In 16 hours the colonies of gonococci can be readily seen as small white points. Toward the bottom of the tube the colonies are larger—sometimes almost as large as staphylococci when grown on ordinary media.

By fishing a small colony a pure culture can be obtained. In order to prove the presence of the gonococcus, make a Gram's stain, and transfer from the subculture to ordinary agar and Loeffler's serum. No growth should be obtained from either.

SOME STATISTICAL OBSERVATIONS CONCERNING TATTOOING AS SEEN BY THE RECRUITING SURGEON.

By A. Farenholt, Surgeon, United States Navy.

In April, 1908, there was published, in the Naval Medical Bulletin, some statistics and notes, arranged by me, relating to the prevalence of tattooing in the United States Navy. These were based upon the examination of the enlistment records of the receiving ship *Independence*, extending over a period of 8½ years and comprising 3,572 men.

I have recently been interested in following up these statistics by an inspection of the available enlistment records of the United States Marine recruiting office at San Francisco, Cal., covering 2½ years and numbering 2,100 men. Although it is neither desirable nor instructive to pursue data of this kind to any great length, it may appear interesting to compare how closely the observations recorded concerning recruits and reenlisted men in the Navy during a period from 12 to 4 years ago correspond with those noted for men enlisting and reenlisting in another branch of the service during the past 2 years.

1. Percentage of men found to be tattooed on examination for first enlistment in United States Navy, 1900–1908 .... 23.01
2. Percentage of men found to be tattooed on examination for first enlistment in United States Marine Corps, 1909–1912 .... 21.41
3. Percentage of men found to be tattooed on examination for second and subsequent enlistments in United States Navy, 1900–1908 .... 53.00
4. Percentage of men found to be tattooed on examination for second and subsequent enlistments in United States Marine Corps, 1909–1912 .... 35.64
5. Percentage of men found to be tattooed on examination for first enlistment in United States Marine Corps but having had previous service in United States Army, 1909–1912 .... 34.21

While, for the sake of precision, it is unfortunate that a greater number of records could not be inspected, I think the ratios are fairly accurate and that the figures can be taken to indicate—

1. That the percentage of this kind of personal adornment among the several classes from which both the Navy and the Marine Corps receive their recruits is diminishing little if at all—23–21.

2. That, after enlistment, the sailor man acquires tattooing more frequently than the marine—53–35.

3. That tattooing is about as prevalent in the United States Army as it is in the United States Marine Corps—35–34.

The character of the designs chosen shows, in the two lists which follow (arranged in order of frequency), a remarkable similarity and a continuance of choice in unchanged channels.

Navy, 1900–1908.		*United States Marine Corps, 1909–1912.*	
Letters, figures, dates, mottoes, words, etc	1	Letters, figures, dates, mottoes, words, etc	1
Female figures, all kinds	2	Female figures, all kinds	2
Flags	3	Flags	3
Anchors	4	Eagles	4
Eagles	5	Anchors	5
Stars	6	Various animals	6
Ships	7	Clasped hands	7
Clasped hands	8	Stars	8
Dagger	9	Hearts	9
Cross	10	Dagger	10
Bracelets	11	Shield	11
Heart	12	Men	12
		Crosses	15
		Ships	17

The first three groups will be seen to be identical and the subsequent ones fairly close. The Navy list gives a percentage of 33, 1 in every 3 tattooed recruits having selected a decoration a part of which represented a female figure. In the case of the Marine Corps this percentage was found to be 34, practically the same, showing that these designs still retain their popularity.

Several of the more strictly deep-sea and time-honored patterns were rarely met. The Jerusalem cross and the pig on the dorsum of the foot were not seen; crosses, crucifixes, Neptune, mermaids and the tombstone, weeping willow, IN MEMORY OF MY MOTHER, once so common, appeared in diminishing numbers. Bracelets, knots, and tattooing on exposed parts are also disappearing. The significance and superstition of many of these marks are rapidly becoming lost, as we have lost forever the gold earrings, the pigtail, and the tarpaulin hat of the ancient mariner, and the conventional book designs of the professional tattooer are more in evidence. A certain levity in selection, which the old tar would certainly deprecate, is often seen—for example, the Katzenjammer kids, Happy Hooligan, tennis rackets, bat and balls, glasses of beer, socks, etc. The influence of Japanese work is increasingly noticed; dragons, flowers, butterflies, animals, and Japanese women are very common. No evidence of infection or the transmission of disease was noticed.

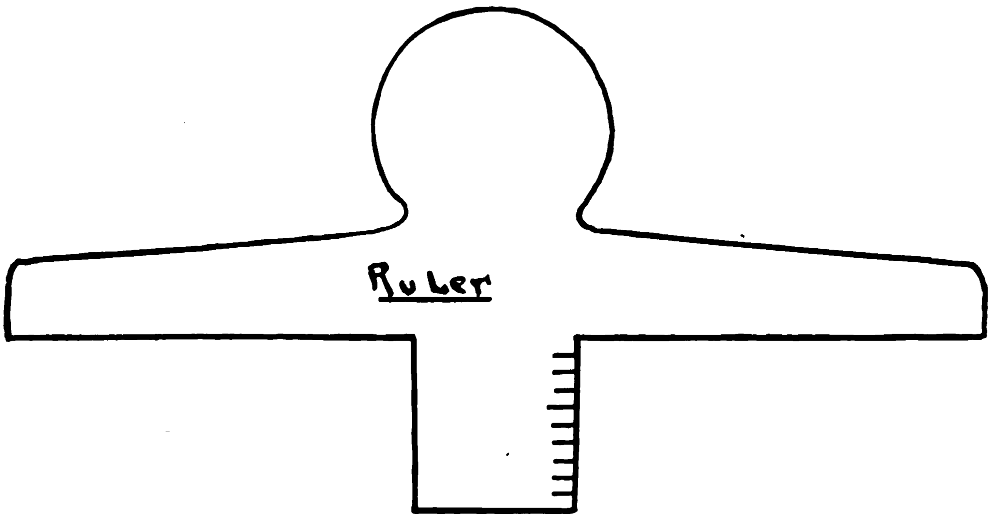
REPORT ON FLAT FOOT.

Based upon measurements of 200 applicants for enlistment in the United States Marine Corps.

By Bruce Elmore, Acting Assistant Surgeon, United States Navy.

The following record of 200 cases was compiled in accordance with the article by Passed Asst. Surg. R. G. Heiner, United States Navy, appearing in the Naval Medical Bulletin of October, 1911.

The manner of taking the measurements was as follows: The candidate was required to run in place and the rigidity of the arch noted, also the tendency of the foot to evert at the mediotarsal articulation; the candidate was then made to stand on a chair having a perfectly flat and level surface with the weight evenly distributed on both feet; a flexible celluloid ruler (see diagram) was used and the distance of the tubercle of the scaphoid bone below "Heiner's line" noted and recorded in eighths of an inch.



Of the 200 cases recorded, 5 per cent were rejected for flat feet. Of the cases rejected, all tubercles were between 5/8 and 10/8 below.

Of the cases accepted, the total average was approximately 2⅜ below.

The following table shows the group measurements:

Right foot.		*Left foot.*	
Level	27	Level	28
1/8	33	1/8	29
2/8	48	2/8	36
3/8	40	3/8	43
4/8	35	4/8	35
5/8	3	5/8	8
6/8	6	6/8	11
7/8	1	7/8	1
8/8	5	8/8	5
9/8	1	9/8	3
10/8	1	10/8	1

CONCLUSIONS.

1. Rigidity of the arch, or, in other words, the tendency of the arch to retain its position under stress of weight, seems to me to be of the greatest importance. Many feet which appeared normal on inspection developed marked bulging and eversion when subjected to the running test, and measurement generally showed the tubercle to be at least 4/8 below.

2. In another group of cases the fat pad underneath the arch gave an appearance of bulging, but on palpation and measurement the bones were found to be in very good position, with strong ligaments. In this type of cases the imprint test is, of course, of little value.

In several instances the measurements were 7/8 or 8/8 below, but the men otherwise had very good feet and were ultimately passed at the recruit depot, and I am of the opinion that there are cases in which the measurement might seem extreme and the applicant still have good feet.

In general, I believe that perfect arches will not measure more than 4/8 below.

The majority of the 200 men examined appearing in this record had been previously passed by the civilian examiners at the recruiting stations, so that this record does not show the total number of applicants rejected for flat feet at the various stations.

A NOTE IN REGARD TO THE HEIGHT AND WEIGHT, AT DIFFERENT AGES, OF APPLICANTS AT RECRUITING STATION, CLEVELAND, OHIO.

By J. E. Gill, Passed Assistant Surgeon, United States Navy.

These figures are taken from 1,713 applicants, 919 of whom were accepted and 794 rejected on account of physical disabilities in the space of 21 months.

Age.		Height in inches.													Total
		62	63	64	65	66	67	68	69	70	71	72	73	74	
21 and over	Number	8	31	111	131	120	137	100	79	29	15	12	5	1	779
	Weight	128	131⅛	132⅛	134¾	138¼	141⅛	145.9	149.9	155.5	162	173.5	187⅜	16[illegible]	141.1
20	Number	.....	10	14	12	14	12	13	11	6	3	.....	1	.....	97
	Weight	.....	124.6	132	131	135	137.5	138.5	140	148⅝	140	.....	183	.....	136.5
19	Number	4	15	22	30	34	26	34	8	18	5	.....	.....	.....	196
	Weight	129¼	121.6	124.1	129⅝	127¼	133¾	139¼	139	149	144.4	.....	.....	.....	132.7
18	Number	3	12	47	60	57	58	38	23	7	6	.....	3	1	315
	Weight	107⅔	116	121.5	123⅝	129¼	131.5	133¼	139.2	144¼	146	.....	160	167	129
17	Number	23	29	45	54	66	59	27	13	4	5	.....	1	.....	326
	Weight	116¾	115¾	119	122⅔	126	125.6	131¾	134¼	138	146	.....	134	.....	124.1
Total	Number	38	97	239	287	291	292	213	134	64	34	12	10	2	1,713
	Weight	119¾	122.5	126¾	129¼	132.5	135⅛	140¼	145.5	150⅝	152¼	173.5	173.5	167	134.4

For 21 years and over the average height is 66 inches and weight 141.1 pounds.

In a few cases the number of applicants were not sufficient to get an accurate average, as one abnormally large or small man threw the proportions and gradations astray, but in the main it gives the height and weight of the average man at a given age. These averages are from 4 to 7 pounds greater than the standard required by the recruiting regulations.

It will be noted that at 17 years of age 19 per cent of the applications were made; at 18 years, 18.3 per cent; at 19 years, 11.4 per cent; at 20 years, 5.6 per cent; and at 21 years and over, 45.4 per cent.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to pathological collection, United States Naval Medical School, October–December, 1912.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
907	Liver	Amoebic abscess	Dr. W. H. Bell, Colon, Panama.
909	Yaws		Do.
910	Brain	Malarial	Colon Hospital, Panama.
912	Testicle	Endothelioma	Dr. E. E. Woodland, U. S. S. Solace.
913	Kidney	Hydronephrosis	Dr. R. Spear, naval hospital, Washington, D. C.
922	Elephantoid mass		Dr. E. U. Reed, Tutuila, Samoa.
927	Section of colon	Acute bacillary dysentery	Dr. W. H. Bell, Colon, Panama.

Additions to the miscellaneous collection, United States Naval Medical School, October–December, 1912.

Accession No.	Name.	Locality.	Collected by or received from—
35	A collection of Anophelinae		Dr. James, Canal Zone.
36	Flies (Stomoxys)		J. Burton, Naval Medical School, Washington, D. C.
37	Nicaraguan wood-ticks		Dr. W. A. Angwin, U. S. S. California.

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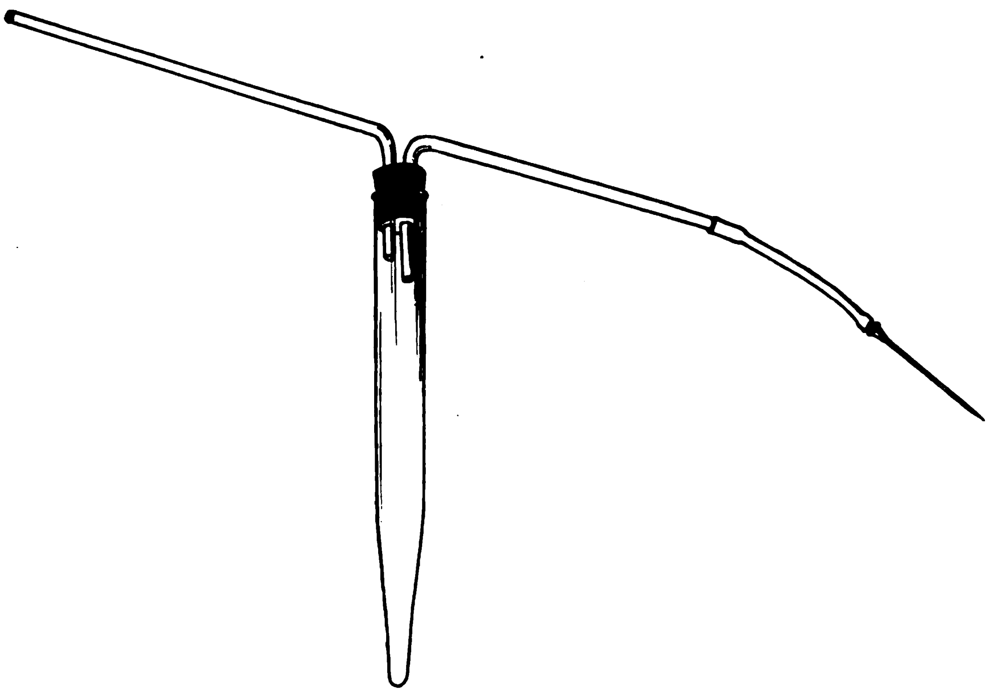
SUGGESTED DEVICES.

APPARATUS FOR OBTAINING BLOOD FROM A VEIN OR FROM THE HEART OF AN ANIMAL.

By G. F. CLARK, Passed Assistant Surgeon, United States Navy.

The apparatus used at the Naval Medical School is very satisfactory for obtaining blood. It consists, as shown by the accompanying diagram, of a centrifuge tube, rubber stopper with two perforations,



and two bent-glass tubes, to one of which is attached, by means of a short rubber tube, a hypodermic needle of good caliber. The other glass tube is used to create a vacuum in the centrifuge tube by gentle suction with the mouth. The tubes, stopper, and needle can be sterilized by boiling. The centrifuge tube, with cotton plug, is sterilized in an autoclave in the usual way.

In centrifuging the blood it is a good plan to run a safety pin through the cotton plug to prevent the plug from being carried down into the tube.

DIET LIST FOR USE ON BOARD SHIP.

Designed by B. F. JENNESS, Passed Assistant Surgeon, United States Navy.

The purposes of this list are:

1. To furnish the Commissary Department with correct information regarding rations to be sent to the sick bay.

2. To enable the Medical Department to check the diets as they are received in the sick bay.

The galley copy is placed in a conspicuous place in the galley and remains there for the day on which the list is issued.

The sick-bay copy is kept by the ward apprentice.

DIET LIST.

Date..................... 191 .

Mess No.	Name.	Rate.	Liquid.	Soft.	Regular.

LIQUID DIET.—Clear or strained soups and broths. Milk, malted milk, eggnog, beef tea, buttermilk, clam broth, tea, coffee, cocoa, orange juice, ice cream, and jellies.
SOFT DIET.—Thoroughly cooked cereals, dipped toast, soft boiled eggs, poached eggs, mashed potatoes, boiled squash (strained), rice puddings (without berries), tapioca, chicken (white meat), baked or boiled fish (well cooked).
REGULAR DIET.—Ordinary ration.

This list to be prepared in duplicate at sick call each morning. One copy to be sent to galley, the other to be filed with temperature charts.

Use letters L, S, and R to check Liquid, Soft, and Regular diets opposite patients' names.

It is not the intention that the Commissary Department procure extra supplies or do extra cooking, unless requested, but to secure from the day's supply such articles for each ration as may coincide with the list of liquid, soft, or regular diet.

The list is printed on paper 7½ by 10 inches.

CLINICAL NOTES.

THREE CASES DEMONSTRATING THE NEED FOR CARE IN DIAGNOSIS OF LEAD POISONING AND APPENDICITIS.

By J. S. Woodward, Passed Assistant Surgeon, United States Navy.

Several recent cases of lead poisoning received at this hospital (Mare Island, Cal.) with diagnosis of appendicitis emphasize the need of care in differentiating the two conditions. The cases were briefly as follows:

W. J. H. (F. 1c).—"Readmitted" as an emergency case of appendicitis, with history of abdominal pain, worse in right lower abdomen, vomiting, tenderness at times seemed marked over caecum, but at other times was slight; a mass was present which might be either a loaded caecum or matted gut and omentum; no definite rigidity; temperature 99.6. As the patient was manifestly suffering severely and had a pulse of 120, an appendectomy was at once done. No blood examination was made before operation owing to lateness of the hour and lack of time. A normal appendix was removed. Recovery uneventful except that "colic" persisted for some days. Blood examination showed white count 12,000, with normal differential and well-marked punctate basophilia. Patient had recently been working at chipping red lead. There was no paralysis.

R. N. C. (F. 2c).—"Readmitted" with diagnosis of appendicitis and with symptoms similar to above but less severe. Blue line on gums; no paralysis; no rigidity; white count 9,000; polynoclears 54 per cent. A well-marked punctate basophilia present. Patient had been chipping red lead. No operation was done, and recovery under routine treatment was fairly rapid.

W. E. O. (C. P.).—"Readmitted" with diagnosis of appendicitis. There was sever abdominal pain, somewhat worse on right side; some tenderness on pressure; constipation; no rectus rigidity. Further examination showed blue line on gums, and blood examination demonstrated punctate basophilia with a white count of 7,700 and 56 per cent polynuclears. History of recent work chipping red lead and painting. Recovery slow but without incident.

It would seem that the points to note particularly in the differentiation of these conditions would be: The blood examination as to white count, differential count, and staining for punctate basophilia; the temperature; the rectus rigidity; the blue line on gums; and the history of work with lead.

LOOSE BODIES IN THE KNEE JOINT, WITH REPORT OF TWO CASES.

By A. M. Fauntleroy, Surgeon, and L. M. Schmidt, Passed Assistant Surgeon, United States Navy.

The presence of loose bodies in the knee joint is not an uncommon affection either in civil or military life, and yet the literature on the subject is very meager, being limited to a few lines in most of the standard systems of surgery. Anyone who has had to deal with a knee of this character can bear witness to its incapacitating effect, causing the patient not only excruciating pain at times by the "locking" of the joint, but the mental effect is such that the sufferer has the joint always in mind and is in constant dread lest some untoward movement cause a repetition of the distressing symptoms.

These loose bodies range in size all the way from a pinhead (mouse bodies) to pieces as large as a lima bean, and by becoming interposed between the articulating surfaces, cause the familiar "locking" of the joint just before complete extension.

The origin of these bodies in most instances is, except in arthritis deformans, from the breaking off of a piece of the semilunar cartilage which may or may not have a pedicle; although small, lipomatous masses become pinched off at times (fringe bodies) and undergo a fibrous change resulting in small, rounded, hard masses which can usually be felt through the skin in the inner or outer, lower synovial cul-de-sac.

The cause of the injury to the fibro-cartilage is usually put down as a sudden twist of the semiflexed joint. Since the outer rim of the cartilage is held down to the tibia by the so-called "coronary" ligament and is a fixed point, that portion wrenched off is from the inner free edge or the end. Cotton, of Boston, thinks that the transverse tears of the cartilage must be due to extreme pressure. Football, tennis, and basket ball are prominent sources of these injuries.

At times the larger bodies can be felt beneath the skin and the patient not infrequently can move them into such a position, but in a number of instances the only evidence of their presence is the repeated "locking" of the joint, and there is no indication of their exact position, which may be anywhere within the joint capsule. In this latter group of cases the X ray is of great help, and a front (or back) and lateral exposure will usually locate the body within very narrow limits, as shown in the accompanying radiographs. The plate itself will show the body very much more distinctly than the print or fluoroscope.

The diagnosis of this condition, from dislocation of one or the other of the semilunar cartilages, is, of course, of primary importance, and should be established before any radical measures are undertaken. As already indicated, the X-ray plate will clear up a large

percentage of cases. It might be well to mention at this point that confusion may arise in interpreting the X-ray plate from the presence of the small rounded sesimoid bones, which are, however, always posterior to the joint and above the joint level. The foreign body in the great majority of instances is located in the anterior part of the joint and well within the limits of the joint capsule. Once the movable body is felt, as indicated above, the diagnosis is, of course, established, but as both conditions are attended at one time or another with an acute or subacute synovitis, palpation of the joint at this time will usually be negative.

In luxation of the fibro cartilage the inner is the one most often affected, and while "locking" occurs from this injury, it is practically always, in the early stages at least, when the limb is in complete extension. On the other hand, the "locking" symptom of a foreign body occurs when the knee is semiflexed. Another point of difference is that, although the small mass may be easily palpitated and appear fixed, it is rarely the seat of pain on pressure if it is a foreign body, while if the lump or mass is a dislocated cartilage it is always exceedingly tender. A small painful or tender lump just above the inner or outer tibial tuberosity, following a history of more or less recent traumatic disturbance, is characteristic of a dislocated cartilage.

The importance of an early diagnosis need not be dwelt upon when we remember that both of these conditions are liable to develop a so-called "hysterical" or "weak" joint if the correct treatment is not instituted at an early stage.

Once our diagnosis is made our line of action is clear. If it is a foreign body, nothing is to be gained by waiting and allowing the joint to become subacutely or chronically affected. The joint should be opened and the foreign body or bodies removed with the least possible traumatism to the synovial membrane. The technique should be varied to suit the case. It may be possible to manipulate the body near the surface and fix it there by piercing it through the skin with a needle under the usual aseptic precautions. On the other hand, we may have to rely entirely upon the X-ray picture, taken from different angles, for our localization. In either case, once the joint is opened, careful exploration should be made with the gloved finger to ascertain the presence of other bodies. We do not believe that there should be prolonged fixation of the joint after removal of the offending body, since these joints are peculiarly sensitive to being fixed in one position for even a short period. From five to seven days, or as soon as primary union has taken place, gentle passive motion each day, with the knee in a pillow splint, will meet the requirements, and the patient will have perfect functional use of the

joint in much less time than when the fixation is prolonged beyond the point indicated.

In the case of a dislocated cartilage, manipulation and pressure, under ether, will usually suffice to restore the cartilage to its normal position. This of course should be followed by complete rest of the joint in moderate fixation to allow the dislocated piece to form adhesions sufficiently strong to keep it in position. If the cartilage persistently remains detached after several attempts have been made to restore it to position, it should then be treated as a foreign body and that part of the cartilage removed.

Since one of the chief sources of loose bodies in the knee joint is the breaking off of a piece of the fibro cartilage, either wholly or in part, it would certainly seem that the rational treatment of even minor injuries of these joints would be to insure rest for a length of time that would allow for the perfect healing of a fractured cartilage. As these injuries are fairly common and so often followed sooner or later by the appearance of a loose body in the joint, indicated by the large percentage giving a traumatic history, it would also seem wise to regard every knee-joint injury with suspicion and treat it with the idea of a possible break somewhere in the continuity of the fibro cartilage, which, without the proper rest, would ultimately work loose.

Case 1.—V. A. C., seaman, admitted to U. S. S. *Solace* April 2, 1911.

History.—First trouble occurred when patient twisted his right knee while running, sometime in 1908. The knee immediately became swollen and would not support the body weight. After one week in bed he was able to walk again. Some time after this it was noticed that the right knee "was not just right." It seemed to catch while walking. Soon after this patient noticed a small movable body just under the skin close to the outer side of the right patella. About one and one-half years ago, while walking, the right knee suddenly "locked" in a position of partial flexion. Since then "locking" has occurred frequently and has happened more often as patient was descending ladders. After each "locking" the joint swells for several days.

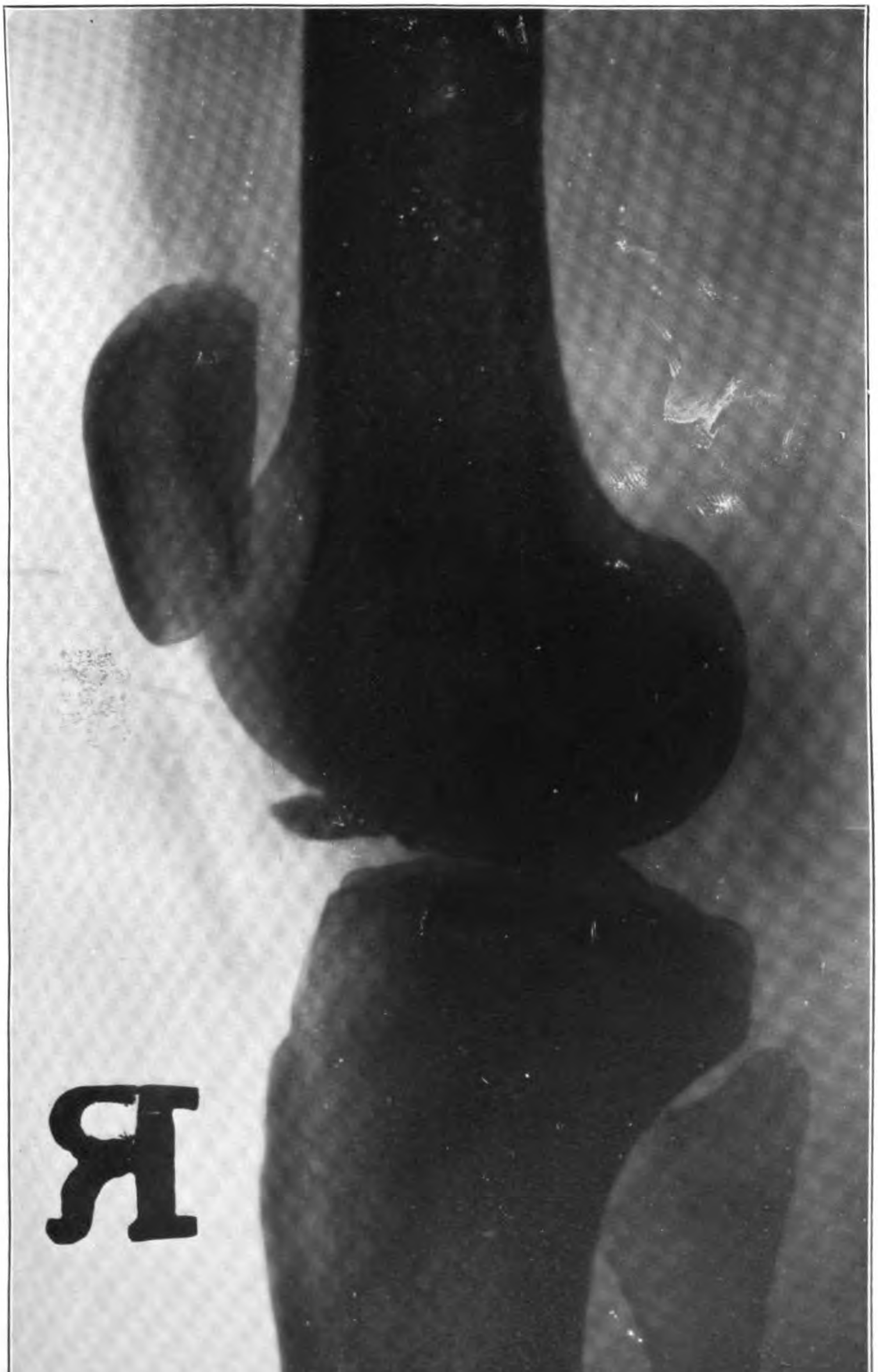
Examination.—Knee normal to inspection and palpation. Radiographs show a disklike body about one-half inch in diameter lying immediately anterior to crucial ligaments.

Operation.—April 12, 1911, under ether: Inner lateral incision and joint opened and explored. Osteophyte the size and shape of a penny found just anterior to crucial ligaments. This was removed with a vulcellum. Joint closed by suturing synovial sac with fine catgut, the deep fascia with chromic gut, and skin with linen. Joint immobilized by a posterior splint.

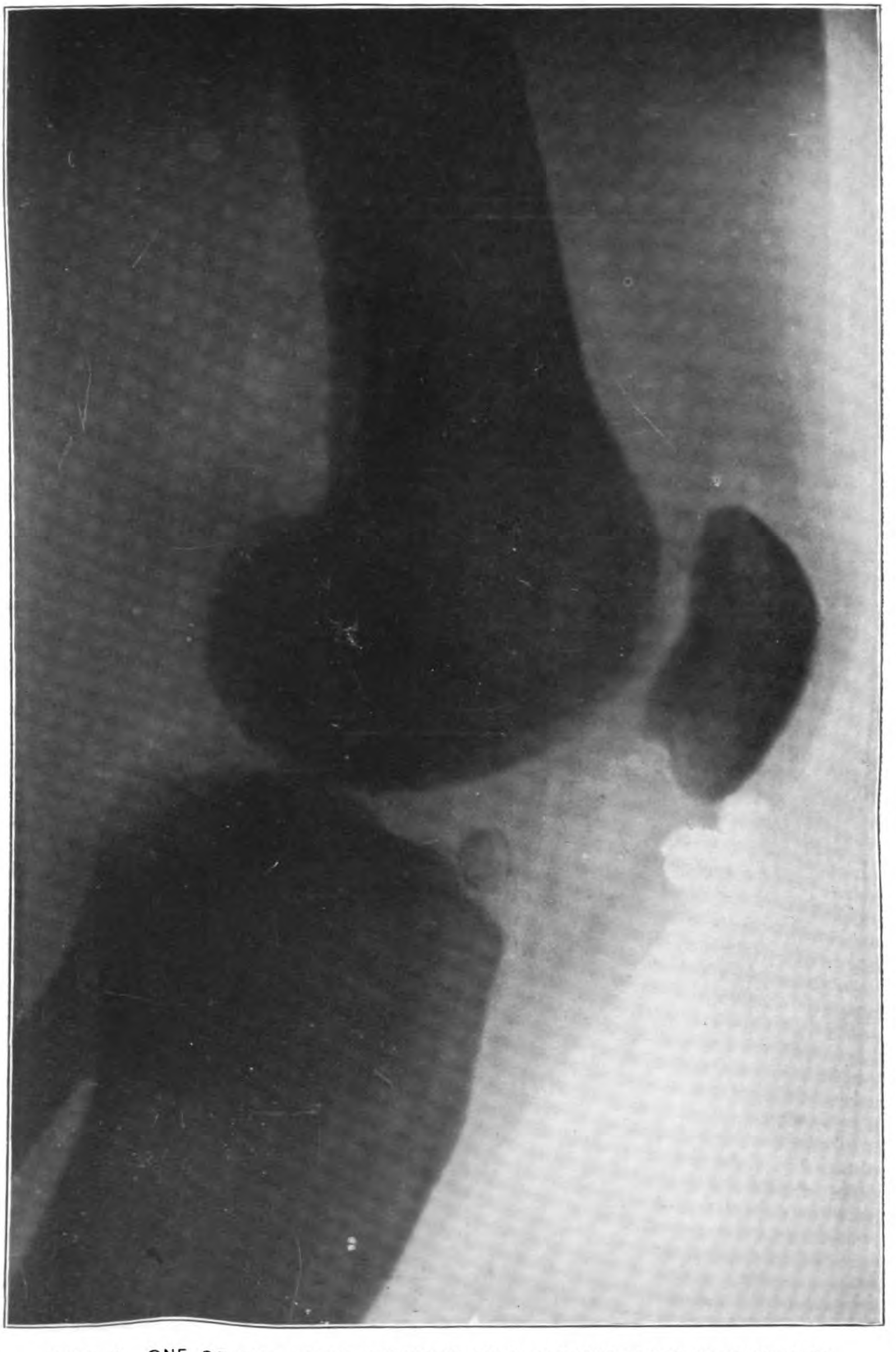
Subsequent course.—Afebrile; after five days splint removed and passive motion given. On seventh day patient walked, and on the thirteenth day the function of the joint was perfect. Discharged to duty on fifteenth day.

Case 2.—H. A. T., seaman, admitted to U. S. S. *Solace* April 9, 1911.

History.—Two years ago, while sick in bed with typhoid fever, as patient tried to bend right knee, it became "locked" in semiflexion. After a little manipulation it could be straightened out again. About one month later, while walking, the knee "locked" again. Soon after this, when rubbing the



CASE 1.



CASE 2.—ONE OF THE LOOSE BODIES IS SEEN PLAINLY CLOSE TO THE TIBIA; THE OTHER IS INDISTINCTLY SEEN CLOSE TO THE UPPER END OF THE PATELLA AND BETWEEN IT AND THE FEMUR.

knee joint, patient felt a small movable body just outside of and below the patella which body when he moved it suddenly disappeared. Since then the knee has frequently "locked" but has never been swollen. Lately another body has been felt to inner side of patella.

EXAMINATION.—Affected knee normal to inspection and all movements are unrestricted. A small, hard, movable body the size of a bean is felt to outer side of ligamentum patellæ. After manipulation of joint a similar body is felt along inner border of patella. A radiographic examination shows both bodies, the outer one apparently laminated.

OPERATION.—April 12, 1911, under ether: Incision made one-half inch internal to inner border of patella and joint opened. The patella presented a notch on its posterior surface, out of which was rolled a flattened, hard, bony body about one-half inch in diameter, freely movable but attached by a pedicle. Pedicle cut and body removed. No other masses found in joint cavity. Incision then made parallel with and to outer side of ligamentum patellæ, cutting down on the external body which was found lying free, and was removed. Both incisions closed in layers. Posterior splint applied.

SUBSEQUENT COURSE.—On evening of operation temperature rose to 101° and there was considerable pain in knee. The following day fever and pain had subsided. Knee given passive motion on fifth day. Splint removed and patient allowed to walk on seventh day. On the twelfth day there was perfect functional use, and patient returned to duty on the fifteenth day.

We are indebted to Passed Asst. Surg. J. R. Phelps, United States Navy, for the radiographic work.

KORSAKOW'S PSYCHOSIS, WITH REPORT OF A CASE.

By HEBER BUTTS, Passed Assistant Surgeon, United States Navy.

This peculiar variety of mental disorder is sufficiently rare to merit a brief description. It is almost always associated with some degree of polyneuritis, though the evidence of the latter condition may be slight or even entirely absent. Such neuritic symptoms as are present are usually confined to minor paralytic signs, such as tremors of the fingers and lips, ataxic gait, Romberg's sign, inequalities of the pupils, diminution or loss of tendon reflexes, and anesthesias, paresthesias, or hyperesthesias of the skin. Foot-and-wrist drop may or may not be present. The neuritic symptoms frequently improve or entirely disappear long before there is any noticeable improvement in the mental symptoms.

Korsakow's psychosis is almost always dependent upon the excessive, long-continued use of alcoholic liquors, but is said on good authority (White: "Outlines of Psychiatry;" Rosanoff: "Manual of Psychiatry") to be also caused by autointoxications and exhaustions, the metallic poisons, and the toxines of certain diseases, such as typhus, tuberculosis, influenza, diabetes, etc. In the few cases I have seen alcohol has always seemed to have been the obvious cause. I use the phrase "seemed to have been" advisedly, because this may

or may not be true. There are many alienists who are coming to regard alcoholism as the *result* of a diseased constitution, but not the cause of a characteristic chronic psychosis. It is well known that alcoholism is quite often an expression of a psychopathic constitution, which may be either congenital or acquired. Many cases of insanity do not become alcoholic until *after* manifesting other pronounced symptoms of a psychosis. So that alcoholism can quite as frequently be regarded as a symptom of any psychosis as a cause.

The most striking symptom of the psychosis is a marked degree of amnesia, both anterograde and retrograde, associated with apparent lucidity and peculiar pseudoreminiscences. To quote from Diefendorf's "Clinical Psychiatry"—

> The lapses in memory are not only not recognized by the patient, but are very apt to be filled in with falsifications of memory, which are related by the patient with a feeling of absolute certainty.

These patients seldom or never have any genuine insight into their mental condition. A patient with nerves so poorly under control that he can not carry a glass of water to his lips, and memory so defective that he does not know his age, or remember the fact that he had breakfast not more than half an hour ago, will inform his physician that there is nothing the matter with him, or he is "only a little nervous," or he "never felt better in his life." Following these statements he may begin to relate, with more or less wealth of detail, pseudoreminiscences of journeys he has made, people he has met, and conversations held, sometimes with celebrities for centuries dead. Such patients unhesitatingly reply to all questions put to them and utterly fail to recognize inconsistencies or manifest contradictions. If their contradictions are pointed out to them, they merely dismiss the subject as of no consequence or simply deny having made a former or a latter statement.

Cases of Korsakow's psychosis are usually erroneously diagnosed "delirium tremens," and though the two diseases usually have the same cause, and have some symptoms in common, there is a marked difference in other symptoms. There is also a very marked difference in the course of the two diseases. In the first place, the patient with delirium tremens almost always exhibits a moderate, and frequently profound, degree of clouding of consciousness, and is not nearly as wide-awake, alert, and apparently lucid as the Korsakow case. In the second place, the delirium tremens patient is delirious, his powers of attention are disturbed, and he suffers with illusions and hallucinations, especially visual and auditory hallucinations. Quite characteristically, he is terrified by the seeing of all sorts of ferocious animals or snakes attacking or crawling about him, and he hears the hissing of snakes, roars of animals, or the curses and threats of enemies. These, and hallucinations of other

senses, are usually conspicuous by their absence in Korsakow's psychosis, or if present, they are fleeting, and disturb the patient but little, or not at all. So that instead of a wildly excited, hallucination-terrified patient with delirium tremens, upon whom at times it is necessary to exercise restraint in order to keep in bed, and from whom it is frequently very difficult, or quite impossible, to get any response to questions, we have in the case of Korsakow's psychosis a patient who, though he may be quite restless, especially at night, is not at all disturbed by terrifying visions and threatening voices; who is either happy or quite indifferent to his surroundings, and with whom we will have little or no difficulty in conversing.

In the matter of course and prognosis of the two diseases, as is well known, the patient with delirium tremens is usually over his delirium within a few days, and the prognosis is generally favorable, barring pneumonia and other complications. Patients with Korsakow's psychosis, on the other hand, seldom or never get well, and the course in any event is a long one, the improvement, if any, slow and very gradual. The disease usually terminates in dementia.

From Diefendorf's Clinical Psychiatry I abstract the following description of the pathological anatomy of this disease:

> There is an extensive destructive process involving the nervous tissue from the cortex to the peripheral nerves. The nerve cells present the usual signs of an acute process, while the nerve fibers give evidence of varying degrees of destruction, especially in the region of the central convolution, when there is a prolonged course of the disease. In the spinal cord there is an extensive atrophy of the fibers, particularly in the columns of Goll. Of particular importance are the numerous small hemorrhages occurring, especially in the central gray matter, where they are regarded as the cause of the oculo-motor paralyses. * * *

In the description of the case which follows the identity of the patient is concealed by the fictitious name "Marathon," given to the collier from whence he was admitted to the hospital.

"Marathon."—Admitted to the naval hospital, Cañacao, P. I., July 7, 1912, with a diagnosis of "alcoholismus." Though he was at all times able to converse without difficulty, and his answers to questions were relevant and coherent, it was at once apparent that he had an extensive amnesia, and he filled in his memory gaps with all sorts of fabrications. Only here and there were there islands of memory, so to speak, of events occurring in the remotely distant past, such as the place of his birth, occupation, and names of sisters and friends. These believed-to-be genuine recollections were so interwoven with pseudoreminiscences, however, that it was impossible to separate fact from fiction in obtaining a reliable history from him at any time during his more than five weeks' sojourn in the hospital.

From a shipmate it was learned that he had for several months past been consuming large quantities of alcoholic liquors in the form

of beer, whisky, and absinthe. This shipmate stated that on the day prior to his admission to the hospital he was known to have consumed 1 quart of absinthe; was unable to state the approximate amount of coal he had in the ship's bunkers or how many pounds of steam pressure he had in his engine boilers, and innocently asked why the ship, which had been tied up to the coal docks for two days, was slowing down.

Upon admission to Cañacao Hospital he attempted to minimize his drinking habits whenever the subject was referred to—admitted he had been drunk a very few times in his life, but would not admit taking more than three or four drinks daily—"not enough to hurt anybody," he said. He emphatically and somewhat indignantly denied that there was anything serious the matter with him, physically or mentally. When an attempt was made to probe for hallucinations he laughingly denied that he ever "heard voices or saw things." "I am not that bad," he said.

Physically he was 5 feet 5 inches tall; estimated weight, about 180 pounds; estimated age, about 40 years. His face was red, the superficial venules dilated. His abdomen was quite protuberant, chest unusually hirsute. His heart sounds were weak, but otherwise normal. His tongue was heavily coated, breath very offensive. During the first few days of his stay at the hospital he passed but small quantities of urine. This urine contained a few granular casts, but no albumin. Under the influence of diuretics the amount excreted daily increased. He had a slight degree of left internal strabismus, but this disappeared within three weeks after admission. His pupils were slightly irregular in outline, but about equal in size, and responded promptly to direct and consensual light and to accommodation. The Wassermann test of his blood serum was negative.

A marked intention tremor was present. This was especially noticeable when he attempted to carry a glass of water or other liquid to his lips, in attempts to button his pajamas, and in catching hold of the arm of a chair preliminary to sitting in it. He was quite unsteady on his feet—walked with difficulty and with feet wide apart. He was unable to stand unsupported on one foot, and Romberg's sign was present. He localized pin pricks fairly well, and no anesthetic areas were demonstrable. Both knee jerks were about equally diminished. Other deep reflexes were also decreased. The cremasteric and epigastric reflexes were apparently absent. He was able to protrude his tongue straight forward from his mouth, but a coarse tremor was present. He was able to whistle, but his lips trembled greatly when attempting to speak. He repeated test words and phrases well. There was no foot or wrist drop present.

Mental examination.—Upon admission he was completely disoriented, and remained so throughout his stay at the hospital. He

seemed to have no idea of time, beyond being able to distinguish night from day. He could not distinguish between morning and evening, but could correctly read the time of day from a watch. He would recognize, as an old acquaintance, anyone who called upon him, but seemed utterly unable to learn anyone's name. No matter how often or how recently his physician told him his name, he invariably forgot it, though he may have been told only a few minutes before, and upon every occasion he was visited. Often he greeted his visitors by fictitious names. His physician was not always recognized as a physician. Sometimes he was recognized as a chaplain, sometimes as a lieutenant, sometimes as the captain of his ship, but always as an old acquaintance whom he last saw from one to ten years ago in various localities on the earth.

On the morning of his admission to the hospital, he stated that he was stopping at a hotel, the name of which he could not remember. He said the day (Sunday, July 7, 1912) was Tuesday, February 24, 1886, and that he came to the hotel about two weeks before.

In the afternoon (about 4 p. m.) of the day of his admission he stated that he was in a German hospital in New York City; the month was November, the year 1903, the hour "between 9 and 10 o'clock in the morning." He had no recollection of having seen the writer in the morning, nor of the occasion of his visit just 20 minutes previously.

Asked as to his whereabouts of the night before, he promptly replied that he had been at the "Seamen's Institute at the entrance to the park" in Renfrew, Scotland. Later in the same evening he "took a rickshaw ride."

In testing his memory it was ascertained that about the only facts he recalled with any degree of certainty were his name, his occupation, and the place of his birth. He frequently stated that he was born in 1872, and this is believed to be the year of his birth, but on several occasions he stated that he was born in 1877, and other years. His age varied from day to day—he was 22, 28, 33, or 39, as his fancy seemed to dictate.

At no time did hallucinations of any sort play any conspicuous part in his psychosis. It is not at all certain that they really existed at any time during his stay in the hospital. He almost daily spoke of holding long conversations with relatives and friends whom it is doubtful that he had really seen for years. These imaginary conversations are believed by the writer, however, to be more in the nature of the fabrications so characteristic of Korsakow's psychosis, and not true hallucinations. At any rate, if he really did have visual and auditory hallucinations, they were always very agreeable ones, and never seemed to frighten or worry him. Moreover, they did not influence his conduct in any way.

Emotionally he was generally apathetic, but sometimes slightly euphoric. In the later afternoons or at night, he frequently became restless, moved about, left his bed, asked for whisky, and attempted to leave the hospital. Unless prevented, he would wander into other officers' rooms, the bathroom, or the dining room, and would then be unable to find his way back to his own room.

His mental state, his disorientation, his amnesia, his pseudo-reminiscences, and his utter lack of insight, are perhaps best shown in the following verbatim report of two conversations I held with him on two occasions, just three weeks apart. The first conversation occurred about 10 a. m., Wednesday, July 10, 1912, just three days after his admission to Cañacao Hospital. At the time he was on a milk diet, lying in bed, and apparently attempting to read the "Cablenews-American," a local Philippine newspaper. He appeared to be in excellent spirits, and when I entered his room he arose from his bed, shook hands with and greeted me as an old friend he had not seen for years.

Do you recognize me? Certainly I do.

What is my name? Well, let me see—I can't just place you—your face is familiar though—you are Mr. Whitney, aren't you?

Where did you see me last? It was in Seattle I saw you—you examined me in Seattle.

When did I examine you? Well, I couldn't hardly say—I think it was about two years ago.

What day of the week is it? To-day is Sunday.

What day of the month? The 24th.

What month? November.

What year? 1886.

Where are you now? In Bremerton.

What place is this? Mr. Galloway's boarding house.

How long have you been here? Been here two weeks next Wednesday.

Where were you last night? I was playing billiards.

Where? In the woods.

How many games did you play? Oh, three or four. I won two of them.

Where else were you? I was at the races.

How much did you win? Oh, not very much—about $14 or $15—I didn't know any of the horses.

About what time of day is it? I should say it is between 5 and 6 in the evening.

What did you have for breakfast this morning? I had a piece of nice steak and potatoes, some nice toast, and some eggs, and that's all.

Did you have anything to drink? Yes, I had some coffee and a little whisky—say, won't you have a "K. T."—I will make one in just a minute for you?

No, thank you. What did you have for lunch? I had a piece of steak for lunch, a piece of pie, and some nice peas.

Where did you say you saw me last? At Palm Beach—you came off the train with me—you took my picture there.

Were you ever in the Philippines? No, the nearest I ever got to the Philippines was Singapore.

What were you doing at Singapore? Coaling ship.

What ship? (Long pause.) Let me see—I forget the name of her—it began with a "C," I think.

Were you ever on the *Marathon?* No, I've heard of her, though. She is a merchant ship, a merchant-warship, isn't she?

How old are you? I am 22.

What year were you born? I was born in 1872, in Renfrew (Scotland).

Have you any brothers or sisters? Yes; two sisters, Lizzie and Mary.

When did you see them last? I saw Lizzie this morning. She is in the next room—I'd like you to meet her—(in a loud voice) "Lizzie, Lizzie, come here." (Silence.) Well, I guess she is busy, but she will be here in a minute.

What is the name of that paper you are reading? Why its—let me see—I forget the name of it.

What have you been reading about? I was reading about the court proceedings.

What about the court proceedings? Why, I forget just what the paper said—it wasn't much though.

What do you do for a living? I am a chief engineer.

On what ship? Its the—(long pause, during which he snaps his fingers several times, and seems to be making an effort to remember). Well, really, I forget the name of her—she commences with an "E," I think—"Marida," that's her name.

How long were you on the "Marida"? Oh, I just joined her yesterday, and I haven't got acquainted much yet.

9 a. m., Wednesday, July 31, 1912. This morning after the usual vigorous handshake and cheery greeting as though to an old friend, the following conversation ensued:

Where are you now? In a hospital.

Where is the hospital? Just across the water from Renfrew.

When did you come? Just came last night. I had a fight with a chicken. The chicken had gaffles on, and he cut me here on the arm—I want you to see it. (Rolls up first one sleeve and then the other, and scans both forearms in search of an imaginary wound.)

I pointed out an old scar to him, with the remark, "Is that it?" Yes; I believe it is.

It seems to have healed very quickly? Yes; the chicken didn't hurt me very bad. I am all right now.

When did you see me last? I saw you—let me see—excuse me for not remembering your name—your face looks familiar—aren't you Mr. Spence? I saw you about six months ago when I was crossing the ferry to Brooklyn.

Who is this lady? (Nurse.) She is—let me see—Miss Ralford—she is an old Renfrewshire girl.

How long have you known her? About 10 years. I knew her grandfather—he was a jovial little fellow. (This same nurse was frequently mistaken for his sister "Lizzie" when she first came into his room, but he would soon discover his mistake, and he would then call her by some other name.)

Where were you yesterday? I was in Arlington, N. J.—I was at the cricket club seeing them blow on the boards.

Where is the cricket club? It is near where the quarantine ships come in—what is the name of it—I can not remember it.

Were you ever in the Philippines? Yes; but it was a long time ago. I was only there about half an hour though. I went there to get my eyes ex-

amined. I was there only for a few minutes. I don't really remember much about the place.

What did you have for breakfast? Some fruit, some fish—some "finnan-haddie"—a slice of toast, and a soft-boiled egg.

Where were you last night? Why, I slept in the harbor master's office in Dumbartonshire, but before I went to bed I went to see a show and a circus. Father was with me.

I thought you said your father was dead? Oh, no; he is not what you would call quite well. He is a pretty old man, and he has come through with a good deal in his day. He took me down the road here to the Jones's estate. He took a gun, but I wouldn't take one—I could not be bothered with it because I wasn't feeling right.

In reply to further inquiries, he stated that he was well acquainted with Moses, Julius Caesar, Prince Bismarck, and Cleopatra—said he "met Cleopatra at Mrs. Witherspoon's," in Denmark, and that he knew Cleopatra's father very well.

At this point in our conversation he evidently mistook me for the captain of his ship, and inquired—

"When are we going to sail?" (To which I replied:) "Oh, about 5 o'clock to-morrow morning."

How much coal have you in your bunkers? About 600 tons, a little more or less.

How much steam are you carrying? 125 to 135 pounds. I think I will go down (to the engine room) and see that everything is all right.

As I was leaving his room he said, "Introduce yourself to my sister when you see her and tell her I am feeling fine. She wears a green Tarleton dress and she is overseeing her kiddies. Her name is Mrs. McCall and she lives just nearly where you land—I don't know the name of the place, but you will find it. Lizzie will be very glad to see you—just introduce yourself to her. Say, did I put up a good fight last night?" On being assured that he had he seemed much pleased, clapped his hand, and said, "I'm glad to know that."

The patient continued to live in this sort of dream life during his entire stay at Cañacao Hospital. His physical condition improved to a degree—the tremors of his hands and lips became less, his control over his voluntary movements improved, his internal strabismus disappeared, and his breath became somewhat less offensive—but his mental condition did not improve.

On August 15, 1912, he was transferred to the naval hospital, Mare Island, Cal., for further disposition, in accordance with the recommendation of a board of medical survey.

As to the question why this individual developed Korsakow's psychosis instead of one of the more common and better-known types of alcoholic insanity but little can be said. Doubtless the individual predisposition is responsible for the fact that the nervous system is attacked instead of, say, the arterial or hepatic system. The nervous system in these cases is the weak link in the chain of bodily resist-

ance—the locus minoris resistentiæ—which gives way, and we have the alcoholic psychosis as the expression of the too frequently irreparable break. The individual predisposition is the end result of many far-reaching factors which have produced it. Chief among these factors is, of course, heredity, with all the complex ramifications of conditions and circumstances of the lives of ancestors and collateral relations, such as marriages and intermarriages, habits, manner of living, environment, work, diseases, accidents, etc., which the term heredity implies. The individual predisposition to alcoholism, or any form of nervous or mental disease, is something, therefore, difficult to define or describe, and something which can never be accurately, or even approximately, measured or weighed.

There is no cure for Korsakow's psychosis. The only measures to adopt which will in any way aid the patient to get well are the absolute withdrawal of alcoholic liquors and the administration of a nutritious diet. These patients can properly only be cared for in an institution for the insane, as they can not be trusted to abstain from further indulgence in alcohol. Renewed debauches will quickly destroy any improvement in mental and nervous condition which may have been obtained.

MULTIPLE COMPOUND FRACTURE OF THE SKULL, WITH HEMORRHAGE FROM LONGITUDINAL SINUS.

By E. W. PHILLIPS, Assistant Surgeon, United States Navy.

This case may illustrate, as the reader pleases, either the success of cranial surgery under difficulties or the phenomenal resistance of the Filipino head. The injury occurred at 5.40 a. m., January 24, 1912, on the U. S. S. *Paducah*, the ship being at that time employed in the Cape Cruz-Casilda survey.

G. B. Mess Att. 3 cl., a Filipino, aged 21, was sitting asleep in a chair when a negro mess boy, later found to be insane, attacked him and beat him over the head with the mattock-shaped handle of a long port wrench. No one was near at the time, and the assault continued for several minutes. When help arrived the victim lay unconscious on the deck, covered with blood, and bleeding freely from cuts on the head.

After removal of his long, thick hair there were found upon the occiput and vertex seven deep, irregular wounds. From one of these, to the right of the midline near the lambda, there was brisk venous hemorrhage. Exploration of these wounds showed hair, dirt, bits of bone, and shreds of scalp. The scalp over the vertex was 1 inch thick and bruised to a pulp. The patient had by now become semiconscious. His pulse was small, weak, and irregular; pupils equal

and moderately dilated; muscles lax; skin pallid, cool, and moist; temperature subnormal.

Because of the patient's condition and the limited facilities at hand the immediate treatment was restricted to cleansing the scalp and the wounds, which latter were drained and lightly sutured. A wet bichloride dressing was applied, and over this an ice cap, and the patient was given a saline laxative and kept warm and quiet. About 10 a. m. he began to react; the pupils contracted and the pulse grew stronger, and when roused he complained bitterly of headache. There appeared ptosis and external strabismus on the right side; these symptoms increased in degree during the day. At 2 p. m. there was evident reaction from laceration of the brain, with symptoms of slowly increasing intracranial pressure, some muscular rigidity, vomiting, irritability, and temperature of 101.5°. The pulse was 70, irregular, and tense. It was decided to intervene.

Certain minor difficulties presented themselves in the way of operating. Thus, the wardroom of the ship, by liberal use of carbolic-acid scrubbing and bichloride sheets, made a fairly safe operating room, but the illumination was bad, and during the operation an officer stood on deck and with a large mirror reflected sunlight upon the operative field.

The hospital apprentice was absent, having been detailed to duty on a barge; his place as assistant was taken by an ordinary seaman without previous experience in such work. Dressings, sutures, etc., were of course ready, but the ship's surgical outfit afforded in the way of bone instruments useful in cranial work only one small trephine, one elevator, and one sharp curette. To these were added one pair of dental forceps, a carpenter's mallet, two carpenter's chisels, and a gouge.

The patient was etherized and a rubber tourniquet applied tightly around the head. The scalp and the wound edges were painted with tincture of iodine; no other antiseptic was used in the wounds. The large wounds to the right of the midline were enlarged and connected, and the skull exposed. Three finely comminuted depressed fractures, connected by numerous fissures, appeared. When the loose fragments of bone were elevated a considerable area of dura and the right margin of the superior longitudinal sinus were exposed. There was a three-cornered rent in the dura, the inner end involving the sinus, from which, when the clots were removed, there flowed a steady stream of venous blood. This hemorrhage was readily controlled by light pressure. Through the dural tear there were removed several pieces of bone; clots followed these, with some fluid blood. The underlying cortex was badly lacerated.

Because of the bruised and devitalized condition of the tissues, all fragments of bone not attached to either dura or scalp were now

removed; enough remained to partially close the bony defect. The sharper irregularities of the bony edge were smoothed off with dental forceps and a chisel; two fine catgut stitches were taken in the torn sinus, and a narrow strip of gauze packed lightly around the tear. The dural rent was not sutured; a drain of folded rubber tissue was inserted therein, and the gauze led out of the posterior angle of the wound, which was closed with interrupted silk worm gut sutures.

Enlargement and exploration of two wounds to the left of the middle line revealed a sharply defined depressed fracture at the bottom of each; one of these fractures was elevated flush with the skull surface, the other nearly so, and the wounds were closed. A sixth fracture, on the right side of the occiput, was left alone, as the patient's condition was not the best. Bulky dry sterile dressings were used, and the patient taken to the sick bay. He recovered well from the ether; said he felt better; and slept six hours.

Next day (Jan. 25) the strabismus had disappeared and the ptosis was less marked. Headache, vomiting, and clouding of consciousness persisted.

On the 26th the patient was brighter, the dressings were changed, and the drains removed. There had been considerable drainage of blood and cerebrospinal fluid. The wounds were clean.

On the 27th and 28th there was intense headache, with small pupils and a slow, full pulse; during the night of the 28th there was discharged, along the track left by the drains, sufficient blood-stained cerebrospinal fluid to soak through the thick dressings. An uneventful convalescence then began. Potassium iodide in 0.6 gram doses was started, and continued for two weeks. The wounds healed by primary union, the sutures coming out on the sixth day. The patient recovered without paralysis or impairment of intellect and went to duty on the thirty-third day. There remained a bony defect beneath the large scar, which was tender for several months. The only sequela during the eight months the patient remained under the writer's observation was occasional headache, worst in the adherent scar.

This case illustrates the advisability of exploring, under anesthesia if the patient be conscious, any suspected depressed fracture of the skull. The extent of bony destruction and intracranial damage was greater than had been supposed. While injury to the sinus was suspected from the character of the hemorrhage, it was apparently negatived by the situation of the wounds, which were too far to the right. The ease with which the hemorrhage from the sinus was checked contrasted oddly with the pressure symptoms which that same hemorrhage had produced. A striking feature of the convalescence was the relief of headache and mental dulness effected by the small doses of potassium iodide.

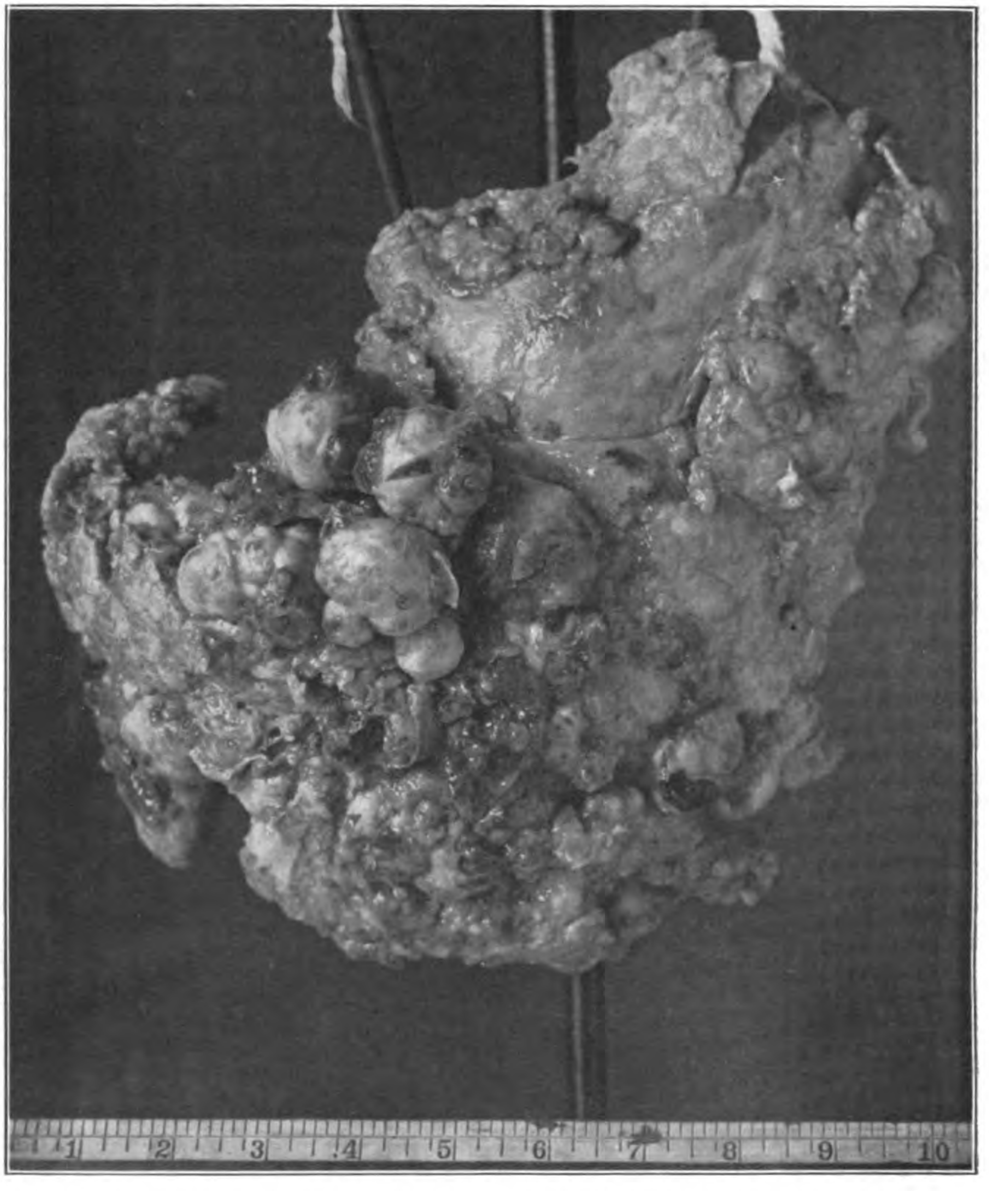
A CASE OF SUDDEN DEATH DURING THORACENTESIS.

By E. O. J. Eytinge, Passed Assistant Surgeon, United States Navy.

The patient, a male native of Guam, 19 years of age, was admitted to the United States naval hospital, Guam, on June 24, 1912, at 8 p. m. No past history was obtainable. For several days he had had "fever and painful breathing" on the right side of his chest. On admission, temperature was 101.3° F. No symptoms other than painful respiration—sharply limited to the right chest. Physical examination showed a muscular, well-developed man apparently not very ill. Left side of chest showed hyperresonance with exaggerated breath sounds. On the right side the breath sounds were diminished. The pain was localized in the right infraclavicular space. Here there were a few faint râles apparently of pleuritic origin. Owing to the hyperresonance on the left side it was difficult to state whether the resonance on the right was normal or diminished. During the next four days the temperature varied from 100° F. to 103.5° F., with a constant rise. The pulse 62 to 112, respiration 24 to 48. The stools showed ova of round, whip, and hook worms. The white cells fell from 14,600 on June 27, to 10,200 on June 29. Differential count showed: Polynuclears, 50 per cent; small lymphocytes, 17 per cent; large lymphocytes, 9 per cent; eosinophiles, 24 per cent.

The eosinophilia was laid to the intestinal parasites. Urine was normal. Other than painful respiration, there were no symptoms. The physical signs showed considerable change. The pleuritic râles in the right infraclavicular space became more numerous and slight dullness with almost absence of breath sounds accompanied them. The lower part of the right chest became more dull and the breath sounds more feeble. The case was considered pleurisy with effusion, the lesion in the infraclavicular region not being diagnosed. An exploratory puncture was made at 2 p. m., on June 29. The needle was introduced in the right sixth interspace in the midaxillary line. No fluid was found. While the needle was being withdrawn and before it had emerged, the patient fell back, gasped once or twice and died. Artificial respiration, dilatation of the sphincter ani and adrenalin, hypodermatically, were of no avail.

Autopsy, held one hour after death, showed the right heart dilated, its walls so thin as to be translucent and in spots almost transparent. The valves and left heart were normal. The left lung was empysematous with healed tuberculosis at the apex. The right lung showed old scars of healed tuberculosis at the base. Just above the root of the right lung was a mass, the size of an orange, compressing the heart and right bronchus, pushing the upper part of the right lung aside and being adherent to the chest wall in the right infraclavicular



EXTENSIVE CARCINOMA OF STOMACH AND OMENTUM COMPLICATING PULMONARY TUBERCULOSIS.

(The unit of measure is the inch.)

region. This was the location of the patient's pain, of the pleuritic râles, of the dullness and loss of breath sounds, all of which would be explained by the presence of the mass. The pressure of the mass on the right bronchus explains also the other physical signs on both sides. The mass itself was surrounded by a thick and strong capsule and was composed of tubercular glands, most of them beginning to break down. The sudden death seems to be due probably to the fatal addition of extra strain upon an already overtaxed right heart.

EXTENSIVE CARCINOMA OF STOMACH AND OMENTUM COMPLICATING PULMONARY TUBERCULOSIS.

By G. D. HALE, Passed Assistant Surgeon, United States Navy.

A. W. H., G. M., 1st class, U. S. N., age 58, and born in Germany, was admitted to the naval hospital, Las Animas, Colo., July 13, 1912, with a diagnosis of tuberculosis pneumonica. He was in a very weak condition, showed an extreme grade of emaciation, and an enormously distended abdomen. During the three weeks from the date of his admission to his death, 5,600 c. c., 2,400 c. c., and 3,200 c. c. of clear bloody serum were removed from his abdomen.

After each removal of fluid, hard masses could be felt through the abdominal wall, the largest of which seemed to involve the great omentum. The chest examination showed advanced tubercular involvement of the right lung. Sputum was loaded with tubercle bacilli. Patient ate practically nothing and was only kept alive by stimulation. Urine was scanty and showed the presence of albumen and granular casts. He died August 4, 1912.

Autopsy showed the following findings of interest: Advanced atheroma of the aorta; densely adherent pleuræ over both lungs; extensive tubercular involvement of the right lung with cavity formation and areas of consolidation; abdominal cavity contained about 2,000 c. c. of clear bloody fluid; the great omentum consisted of an enormously thickened nodular mass of carcinomatous growth; masses of new growth similar to that of which the omentum was composed were scattered throughout the abdominal cavity, smaller ones over the peritoneal and liver surfaces; stomach hard and boardlike, with thickened walls and an almost entire obliteration of the stomach cavity; liver small and cirrhotic; right kidney consisted of a large cyst.

The accompanying photograph shows the stomach, a rubber tube being run from one orifice to the other, and the omental new growth. Weight of specimen, 8 pounds.

EIGHTEEN CASES RESEMBLING CLIMATIC BUBO.

By R. G. Heiner, Passed Assistant Surgeon, United States Navy.

These cases occurred on the U. S. S. *Pennsylvania*, starting after liberties at Valparaiso, Callao, and Panama on the way north to San Francisco in 1909.

The first case appeared after leaving Valparaiso and the last reported three weeks after leaving Panama.

They all denied veneral history, but each and every one admitted exposure about three weeks previous to first symptoms.

All had anorexia, malaise, headache, general pains, and marked swelling of inguinal glands. All temperatures ranged high, some as high as 105.2°.

No case had urethral discharge, venereal sore, or any infection of lower extremities.

None of the glands went on to suppuration, although in some cases they were very large. In some cases the glands of both sides were enlarged.

I have no record as to whether there was general glandular involvement in any of the cases.

In 13 cases the inguinal glands were excised and smears from each and every one of same showed gonococci present.

Five cases were not excised and no microscopical examination made.

The average time on the sick list for the excised cases was nine days, for those not excised much longer.

These cases resemble two cases of climatic bubo reported in the Bulletin for July, 1912, in all respects except the sterility of the gland juice.

I believe that my 18 cases were due to an attenuated form of gonococci.

EDITORIAL COMMENT

THE PRESENT STATUS OF FIRST AID IN THE NAVY.

The present scheme of first-aid instruction by divisional officers insures instruction to every enlisted man in the Navy. This instruction is based primarily on military grounds, and aims to keep as many effectives as possible at their stations under the stress of battle. If the line officer, for instance, who drills his men at the guns, teaches them first aid, they will take the instruction seriously and will soon become proficient.

Three 10-minute periods each week are sufficient. The instruction may be grouped under three heads: (1) The checking of hemorrhage; (2) the application of dressings; (3) resuscitation methods.

I have prepared simple instructions, which will soon be issued, for the guidance of line officers and others engaged in this important work. Medical officers must see that the divisional officers understand these instructions and should be present from time to time when first-aid drills are going on in order to see that the methods are thoroughly carried out.

The structural features of battleships are such that in many, if not most, situations the officers and men will be entirely dependent upon their own resources.

The instruction is based on the theory of self-help first, and assistance from others when an immediate return to station is thought possible; otherwise, the individual lies where he falls until the action is over.

No attempt has been made to teach the men how to care for grave injuries such as compound fractures. My plan for caring for the wounded after battle justifies medical officers and divisional officers in teaching the men to lie where they fall if seriously wounded, as they will receive skilled surgical attendance promptly and will later be transported by trained bearers.

They should be told that hasty transportation by crude methods and unskilled hands is not only unnecessary, but positively harmful.

An example will clearly show what can be accomplished by first aid to be helpful from a military point of view. Let us assume that an important member of a gun crew has received a lacerated wound of the forehead. Blood streams down his face, blinding him, and

farther down over his chest and clothing. His ghastly appearance might stampede near-by shipmates unused to the sight of blood. A trained man under these conditions might himself apply a first-aid dressing, thus checking the flow of blood, clean up, and promptly resume his place at the gun.

It is expected that medical officers will provide the dummy dressings necessary for these drills. If the material for their construction is not on hand, samples and supplies will be furnished on requisition.

Particular attention should be paid the instruction given the officers in resuscitation methods. The employment of these measures is frequently necessary in suspended respiration in cases of submersion, exposure to smoke, powder gas, or severe electric shock.

If these first-aid measures were of no military value, they would be justified on purely humanitarian grounds. As carried on formerly the instruction accomplished little, the medical officers rarely getting the same groups of men oftener than once in three months, and then for but short periods at a time.

I feel that it is the duty of every medical officer properly to prepare those who are to give the instruction, and to excite interest and enthusiasm in these drills.—(C. F. Stokes, Surgeon General U. S. Navy.)

NAVAL MEDICAL SCHOOL LABORATORIES.

It will be noted by the readers of this journal that there is a marked reduction in the size of the lists of additions to the pathological and miscellaneous collections and no additions to that of the helminthological division.

Heretofore all specimens received were reported, but this plan has led to the inclusion of some of no special interest to the corps at large and much unnecessary repetition. Therefore, from now on only new and particularly valuable specimens will appear in the lists given in the Bulletin.

This change in policy should in no way deter medical officers from submitting material; in fact, they are urged to take a greater interest in this subject and to forward any specimens that become available, as there is constant need of fresh material for use in instruction in the school, and that which is not so used will add to the extent and value of the collections.

In this connection the attention of medical officers is invited to the following articles which have appeared in the Bulletin:

"The need for a pathological collection at the United States Naval Medical School." C. S. Butler, surgeon, United States Navy, Vol. IV, No. 3.

"Helminthological technique." P. E. Garrison, passed assistant surgeon, United States Navy, Vol. IV, Nos. 3 and 4.

"The United States National Museum in its relation to other Government scientific collections." P. E. Garrison, passed assistant surgeon, United States Navy, Vol. V, No. 1.

"The Naval Medical School collections." P. E. Garrison, passed assistant surgeon, United States Navy, Vol. VI, No. 1.

Proper containers for transmission of specimens may be obtained from the Naval Medical School, each accompanied by a detailed description of the method to be used in preparing the material.

FRACTURES OF THE LONG BONES.

The question of treatment in fractures of the long bones has developed so rapidly in the past few years that it has now become almost imperative to thoroughly examine the mass of evidence that has been submitted and to attempt to reach some definite conclusions regarding the methods that are being used.

With this end in view, the American Surgical Association has appointed a committee to report upon the "Operative and nonoperative methods of treating closed and open fractures of the long bones and the value of radiography in the study of these injuries." Medical officers, who have published papers relating to this subject within the last 10 years, will confer a favor and aid in this important work by sending two reprints to John B. Roberts, chairman of the committee, 313 South Seventeenth Street, Philadelphia, Pa., as soon as practicable. If no reprints are available, the titles and places of their publication are desired.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

A. W. DUNBAR, Surgeon, and J. L. NEILSON, Surgeon, United States Navy.

LEA, C. E., M. D., VICT., M. R. C. P. Lond. **Auriculer fibrillation.** Lancet, November 2, 1912.

This pathological condition, constituting one-half of clinically recognized cardiac irregularities, is readily determined by its associated symptoms.

The *diagnosis* rests almost entirely on the pulse which shows: (1) Absolute irregularity, with no relationship between the size and strength of beats and preceding diastolic pauses. (2) Presence of venous pulsation in the neck, the larger jugular wave being synchronous with the ventricular systole. It is more evident when the pulse is rapid, and may be recognized by the patient as a sense of fullness in the neck. (3) Polygraphic evidence. The venous tracing shows (*a*) complete absence of the normal **a** wave (auricular systole), (*b*) the presence of the "ventricular type of venous pulse" characterized by the **v** wave assuming a position relatively near the **c** wave.

SYMPTOMS.—Inasmuch as this symptom complex is usually associated with preceding cardiac lesions it is difficult to identify those distinctive of each. In mitral stenosis MacKenzie has noted pain of angina character, faintness, pallor, and increased dyspnea and disappearance of the presystolic murmur.

The associated cardiac conditions may be grouped as follows: (1) Those affecting mainly the venous base of the heart, i. e., the auriculo-ventricular valves. (2) Those affecting the cardio-arterio-renal system, i. e., the arterial base of the heart, the aorta, and the arterioles as in arteriosclerosis and granular kidney. (3) Other diseases, among which rheumatism is important.

Fibrillation may be associated with heart block, paroxysmal tachycardia, or extra systole.

TREATMENT.—There is no specific for this condition, which may occur or cease without cause. The associated symptoms are alleviated by digitalis which MacKenzie recommends in fairly large doses.—(A. W. D.)

Rogers, Leonard, M. D., F. R. C. P., I. M. S. The rapid cure of amebic dysentery and hepatitis by hypodermic injections of soluble salts of emetine. British Medical Journal, June 22, 1912.

The author introduces the subject of his article with a brief history of the use of ipecacuanha as a drug and a statement as to its serious drawbacks. He then states that, in 1911, Vedder showed that emetine, the principal alkaloid of ipecacuanha, had "the power in high dilutions of destroying amebæ in broth cultures, although it is not clear that this was a pathogenic form, which most authorities believe have not been cultivated." The writer, however, has tested the effects of soluble emetine hydrochloride on *A. histolytica* in dysentery stools and found that "on placing a piece of mucus containing numerous active amebæ in normal saline solutions of this salt the pathogenic organism is immediately killed and materially altered in its microscopical appearances by a 1 in 10,000 solution, while after a few minutes they are rendered inactive, and apparently killed, by as weak a solution as 1 in 100,000."

With these results in mind Dr. Rogers determined to attempt the use of this powerful alkaloid hypodermically in the treatment of amebic disease and the results he has obtained are so striking as to raise great hopes that a reliable treatment has been found for this serious condition.

To illustrate his method and the results, the author reports three cases typical of amebic disease: one of acute hemorrhagic dysentery, one of severe chronic dysentery, and one of acute hepatitis following amebic dysentery. In all three ipecacuanha could not be taken by mouth owing to the excessive nausea and vomiting produced. Briefly stated the remarkable histories of these cases are as follows:

Case 1. *Acute hemorrhagic amebic dysentery.*—A Japanese female, aged 29, with a history of diarrhea and sickness for 3 days, with 4 to 5 black stools daily and severe epigastric pain. On the third day after admission to the hospital *A. histolytica* were demonstrated in the stools, and the patient was feeble and restless, with deep sighing respiration and severe epigastric pain and passing 7 large black hemorrhagic stools in 24 hours. Dover's powder was vomited. A 10-grain dose of ipecacuanha produced a similar result, and the position became critical. At 3.30 p. m., one-sixth of a grain of emetine hydrochloride (equivalent to 15 grains of ipecacuanha) dissolved in sterile normal salt solution was given hypodermically and at 7.30 one third of a grain was injected. Only one stool was passed during the night.

On the next day at 10 a. m. one-third of a grain of emetine hydrochloride was again administered, making the equivalent of 75 grains of ipecacuanha the patient had received in 16½ hours. Further

progress was uneventful, and after another week, during which ipecacuanha was given by mouth, the patient left the hospital.

CASE 2. *Severe chronic amebic dysentery of 3½ years' duration.*—This patient was a high-class East Indian, who, after repeated attacks of amebic dysentery, extending over 3½ years, had been bedridden the last 4 months. He had been treated by various eminent medical men, had received dysentery vaccine without avail, and had been advised to undergo colotomy as a last resort, but owing to his weakened condition it was feared that he could not withstand the shock of the operation. When the author first saw him, he was passing over 20 foul stools of pure blood and mucus in 24 hours, his pulse was 120 and over and intermittent, and his general condition bad. *A. histolytica* were demonstrated. Emetine hydrochloride was administrated hypodermically, the first dose being "one sixth of a grain, which was rapidly increased to one-third twice a day, being equivalent to 60 grains of ipecacuanha."

On the second day blood had disappeared from the stools and fecal matter had appeared. The mucus steadily lessened and disappeared after the tenth day, at which time he weighed 80 pounds. In the next two weeks, during which time the dose of emetine was gradually reduced to one-sixth grain every other day (to guard against a relapse), his diet was steadily increased and he gained 8 pounds, passing but 2 or 3 fecal motions daily.

CASE 3.—*Acute hepatitis following amebic dysentery.*—This case was that of a European lady suffering from fever and pain over the liver for 10 days, who had had an attack of dysentery 2 months before. Widal tests were negative for typhoid and paratyphoid.

Ipecacuanha given by the mouth was first tried with beneficial results, but the nausea and vomiting resulting was so severe that after three days the patient refused to continue the treatment. During the next three days, without treatment, the hepatic pain returned and the temperature rose to 103° F. each evening. At this period the author injected one-third of a grain of emetine hydrochloride in the afternoon, with the result that the temperature steadily fell during the next 24 hours to 100° F. and the liver pain disappeared. He then administered a second dose of one-half grain (equal to 45 grains of ipecacuanha).

The next four days passed without treatment, but on the evening of the fourth the temperature had risen to 103° F. "The former doses were repeated and the temperature declined steadily, to reach normal in three days, when two more similar doses were given to guard against any recurrence, and no more fever or other trouble has occurred."

As the author states, one of the most surprising features in these cases was the total absence of any disagreeable symptoms following

the administration of the emetine. No local irritation was produced. There was neither nausea, vomiting, nor even temporary depression of pulse. In fact, not the slightest unpleasant effect was observed, even when the equivalent of 45 grains of ipecacuanha was given at one dose. These striking results may also be obtained, according to Dr. Rogers, with the use of emetine hydrobromide, given hypodermatically, but this salt is not so soluble as the hydrochloride.—(J. L. N.)

BROOKS, HARLOW, M. D. **The effects of college athletics on after life.** The American Practitioner, November, 1912.

According to the author this is not a simple or axiomatic matter, but is a subject worthy of more thought and consideration than is customarily devoted to it.

He rightfully states that from a "mental and social" standpoint the advantages of athletics to a college man far outweigh the disadvantages. Such an individual enjoys privileges not accorded his nonathletic companion. He wins the friendship, respect, and admiration of instructors and upper-class men, and comes in contact with more men who both in college and in after life can not fail but to contribute to his general education, polish, and social and business advantages.

"College athlete" is no longer a synonym for "defective" in strictly literary or scientific studies, for such a one is probably fully the mental equal of those whose entire time has been devoted to literary and allied studies. The healthy life he must lead in order to excel in athletics insures a healthy mind action. What he may lose in mental finesse is made up for by the schooling he receives in discipline, in "teamwork," patience, and in silence under adversity. To quote the writer's exact words:

> Does anyone think that the severe discipline of West Point, its loyal teachings, the subordination of subordinates, or even the occasional submission to personal injustice for public policies unfits for life? We have too little of this in our ordinary training of young men. Discipline, tact, and submission often become special postgraduate courses pursued at great cost and with great humiliation in after life by him who has not been previously schooled in these directions.

Fortitude and self-restraint necessary on the athletic field are traits even more essential in after life.

Dr. Brooks then discusses the "physical side" of the question, based upon his own observations and the opinions of other physicians. He believes that the "best single qualification for the strain and contest of modern life is good physical health," and without this the enjoyment of success and even success itself is of little value. Since the function of a college is to prepare the young man in a manner that

will best enable him to "cope with and conquer the problems of life after he leaves his alma mater," the author considers that the crucial test of the value of modern college athletics is whether or not the physical training of the college athlete helps the business or professional man in his after life, and he answers this question in the negative.

I have had frequent opportunities to test this question during the past 15 years. As a medical officer of a National Guard regiment, largely composed of ex-college men, it has been my duty frequently to examine them and to oversee their military work anywhere from 5 to 15 or 20 years after they have left college. During one year I examined in this organization 12 different men, all at one time famous as college football players and 6 of them ex-captains of their teams. These men were subjected to the same work and physical tests as those men who had passed through their college course without any particular athletic distinction or who had never enjoyed the opportunities of college life. Of these 12 famous athletes but one could be rated physically up to the average of his comrades of his own age. This one exception, I may perhaps add, was a Yale alumnus and has since died in his early thirties of acute diabetes mellitus.

I have found quite similar conditions pertaining in regard to the other college sports, and the defects become even more marked in trackmen, and especially in oarsmen. They appear perhaps in the least degree of all in baseball players.

Conversation with other physicians, especially with those connected with or associated in athletic clubs, has brought out very generally the same observation. The distinguished college athlete after 10 years of severe business life is physically below the average college man in his physical possibilities and in the measure of his resistance against disease. He may even fall below the level of the entirely nonathletic man. The defects as I have observed them are chiefly confined to lesions or disturbances of the heart and other circulatory organs, to adiposity, or to joint disease.

The author then briefly explains the reasons for this deterioration, the change in mode of life, the inability to take exercise, the degenerative processes that take place in the muscles, the demands made upon the organism by the overdeveloped musculature that can not be met without great strain on the entire economy, and emphasizes the danger which lies in the fact that the hypertrophy occurs during the adolescent years. He feels that, even though physical trainers and many others will dispute his opinions, the physicians who have had to do with athletes as family practitioners or consultants in after life will support his views, as do the insurance companies, who look askance at the ex-college athlete.

In response to the question, "Is there no way by which the enormous advantages of college athletics may be realized without these after defects which may hamper or ruin the adult life of many living under modern normal and obligatory conditions?" the author writes as follows:

I believe that there is. Its secret is a warning against overspecialization in athletic work, the making of records while the body is still in its growing period, when an unbalancing of growth and development may readily be induced.

Physical training and development must take place along slower and more general and more normal lines; it must be designed toward the evolution of a strong proportionately capable human body, not to the production of a human imitation of the greyhound or buffalo. When this is realized and the effort is made not to create abnormal records on the college athletic field with bodies as yet young and normally immature, but to send out of college men physically as well as mentally qualified and equipped to grapple with the necessary vigors of business life, then the oft-heard tale of athlete's heart, or overstrained kidneys, or of general physical breakdown will become less familiar to the physician, who now views the after life of the college athlete with anything but cheerful favor. We must learn to secure in college athletics the greatest possible benefits for the many and without the great defects for the few. In athletics, as in education, the college should equip and prepare for the most efficient life, and not strive for immediate scholastic or athletic records.—(J. L. N.)

SURGERY.

R. SPEAR, Surgeon, and H. C. CURL, Surgeon, United States Navy.

MAYO, W. J. **Nephrectomy without drainage for tuberculous kidney.** Surgery, Gynecology, and Obstetrics, November, 1912.

It was formerly the custom to drain cases of nephrectomy for tuberculosis of the kidney in the Mayo clinic, especially if tuberculous material had escaped into the wound. A sinus usually followed, which healed slowly, and many times a mixed infection followed and a failure to cure the patient resulted.

At present in these tuberculous cases the kidney is removed and the wound cleansed as well as possible and the cavity is filled with normal salt solution. It is believed that the tubercle bacilli left in the wound become attenuated and are absorbed before there is an opportunity to establish a favorable culture condition. The salt solution is absorbed as rapidly as if given subcutaneously.

In cases in which no tuberculous material has escaped into the wound there is no necessity of salt solution, but these cases should not be drained.

The incision used is a vertical one, which frees the attachment of the twelfth rib, and then a long transverse cut, which mobilizes the lower wall of the thorax. Through this incision a very large kidney can be removed.

For a number of years the Mayos have practiced injecting 10 to 20 minims of carbolic acid (95 per cent) into infected ureters; ureters so treated have rarely given any trouble.

These cases are not drained and the possibility of mixed infection is lessened. Experience has taught the Mayos that it is a mistake to drain any tuberculous lesion in the abdomen, for drainage in these cases is often the cause of the death of the patient several months later.—(R. S.)

Flint, Joseph M., M. D. Embryonic bands and membranes about the cæcum. Johns Hopkins Bulletin, October, 1912.

The author devotes most of his attention to the question of etiology and discusses Jackson's membrane and Lane's band from this standpoint.

Three types of membrane are found:

The commonest group is that where the veil extends from the parietal peritoneum along the lateral margin of the colon, particularly near the hepatic flexure, over onto the lateral and ventral aspects of the colon and cæcum. The caput may or may not be free.

Another type occurs lower down and extends from relatively the same part of the parietal peritoneum over onto the head of the cæcum, and usually covers part or all of the appendix.

The third is rarer, extends from the ventral aspect of the colon and passes over and is continuous or adherent to the omentum. Intermediate stages are, of course, common.

The normal development of the colon and cæcum is described, and attention is particularly called to the "descent" of the cæcum from its subhepatic position and the adherence of the posterior surface of its mesocolon.

Fusion of the peritoneum usually takes place only in the approximated portions, but at times the fusion is excessive, and attachments are formed with the cæcum in the subhepatic position that extend over onto the lateral and ventral aspects of the cæcum and embryonic colon.

Given these attachments, the subsequent descent draws them out into the thin veil-like structures that have been described as membranous pericolitis.

Many cases give no symptoms, but when obstruction is caused, or where ptosis is present, associated with distention of the cæcum, there may be pain and distress on the right side with tenderness above the region of the appendix. Chronic intestinal stasis (with its group of symptoms) is common.

Simple freeing of the gut is advised rather than any attempt to strip the membrane. Stripping leaves a denuded surface for further adhesion.

In cases discovered at operation and manifestly not causing symptoms, leave them alone, as they are often not pathological so much as simple variations of normal structures.

Lane's band and kink.—This condition, associated with chronic constipation and its symptoms, consists of a new band, which forms on the under surface of the mesentery of the last few inches of the small intestine.

This produces a kink or obstruction of this portion of the intestine, and, as the symptoms are somewhat similar to those of appendi-

citis, a large number of normal appendices have been removed to bring about a cure of symptoms resulting from this obstruction, "needless to say, without any particular benefit to the patient."

The structure is considered as embryological in many, if not in most, cases, though adjacent inflammations of the appendix may cause or increase it.

Treatment consists in cutting the band, after which there is often a remarkable unrolling of the intestine. Martin keeps his patients in the Trendelenburg position to prevent re-formation of adhesions, but ordinary post-operative distention of the gut will usually accomplish the same result.

At times a band from the hepatic flexure of the colon to the gall bladder is found, which gives the usual symptoms of angulation and obstruction. Its treatment is, of course, the freeing of the gut by cutting the band.

The writer strongly urges that an incision of sufficient size be made to thoroughly examine the viscera liable to be involved in the abnormalities mentioned.—(H. C. C.)

FRAZIER, CHARLES H., M. D. **The recognition and treatment of lesions of the right iliac fossa other than appendicitis.** Annals of Surgery, November, 1912.

After calling attention to the importance of lesions of the right iliac fossa, Dr. Frazier says that—

> We now seem unanimously of the opinion that every case of acute appendicitis should be operated on at the earliest possible moment, except that most surgeons, probably the great majority, postpone operation for a time in the presence of spreading peritonitis.

The "buttonhole" incision for appendicectomy is condemned, as it does not enable the operator to discover the state of the viscera.

Each case of "chronic appendicitis" should be studied carefully and the condition of surrounding organs definitely determined at operation, especially where there is no history of a definite acute attack. The following conditions are to be considered:

1. *Jackson's membrane.*—This condition, formerly reported under the name of "membranous pericolitis," is one in which the colon seems placed in a membranous bag "slightly too short to contain it without wrinkling." It does not resemble ordinary adhesions, in that it does not enter into close organic union with the peritoneum of the colon, cæcum, and abdominal wall, and can be stripped off as a veil.

The etiology is doubtful, but it is probably embryonic and not due to repeated slight inflammations.

The symptoms are, in general: Pain and tenderness, constipation, gaseous distention (most marked over cæcum), mucous discharge

from bowel, loss of weight and tone, various forms of gastric indigestion, and neurasthenic manifestations.

Best results seem to have been obtained by dissecting the membrane from the colon and by attending to sluggish peristalsis after operation.

2. *Lane kink.*—This is manifested by an acute bend of the ileum about 6 inches from its termination, due to thickening or contraction of the mesentery or to an adhesion of adjacent arms of the angle or the bowel to its mesentery. This may be embryological or the result of inflammatory adhesions.

Symptoms are similar to visceroptosis in general except that there is often a tender area from umbilicus down and to the right, and frequently malaise, headache, backache, nausea, and other symptoms of gastro-intestinal stasis may be present.

Treatment consists of separating the adhesions and freeing the bowel.

It is advised that at all operations in this region the first part of the ileum be examined for this condition; otherwise in many cases no improvement follows appendicectomy in which a band is allowed to remain.

3. *Cæcum mobile.*—This is, strictly speaking, not so much an abnormal cæcum as one which, due to its tendency to form a pouch, causes intestinal stasis, with all its unpleasant symptoms.

There is usually colicky pain in right iliac fossa, mostly without fever, and accompanied by soreness and constipation, with occasional attacks of diarrhea after attacks of colic. The bismuth radiograph shows the condition quite well. There is often distention in the region of the cæcum.

Treatment is as yet not well worked out. Some operators fasten the bowel to the lateral abdominal wall; some, as advised by Wilms, place the cæcum in a peritoneal pouch made by incising the parietal peritoneum external to the attachment of the mesocolon, and others plicate the wall of the cæcum by a continuous Cushing suture for a distance of 4 or 5 inches.

In conclusion, the author again urges careful study of each case and the use of an incision of ample size.—(H. C. C.)

HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANSDELL, Passed Assistant Surgeon, United States Navy.

CONNOR, M. E., M. D. **A device for keeping garbage cans in place.** Am. Jour. Public Health, Vol. II, No. 8, August, 1912.

The Department of Sanitation in the camps of the Canal Zone and cities of Colon and Cristobal has for several years overcome the carelessness, mischievousness, indolence, and ignorance of imported

laborers and natives in the matter of keeping garbage cans covered and in place by erecting a stand or shelf for each can well clear of the ground at places most convenient for filling and collecting, and by substituting for the usual metal cover a hinged lid or cover of wood which would automatically drop after use and close tightly to prevent ingress of flies, rats, and other vermin.

Working plans of the stand accompany the article, and the average cost of each of the 2,000 in use is said to have been $1.29 gold—(C. N. F.)

JONES, G. C., M. D., C. M., M. R. C. S. **The sanitary aspect of a besieged town.** Jour. Royal Army Med. Corps, Vol. XIX, No. 5, November, 1912.

The director general of the militia of Canada believes that insanitation is the one never-changing, foremost, and primitive weapon in siege warfare, and having in mind Quebec, Vicksburg, and particularly Port Arthur, he asks, "What might have been the bearing on the final outcome of the war if the sanitarians had taken the precaution to have seen that a needful supply of a prophylactic, such as lime juice, was provided for the garrison at Port Arthur?" where there was a sufficiency of certain foods.

"Most sieges end because the sanitary state renders life impossible, * * * the sanitarian is the first line of defense," and by conquering disease may make the fortress impregnable.—(C. N. F.)

OGILVIE, W. H., Major, I. M. S. **Sunstroke—a heresy.** Jour. Royal Army Med. Corps, Vol. XIX, No. 4, October, 1912.

After nearly 20 years of tropical service, Ogilvie questions any essential differentiation between sunstroke and heat stroke. Actinic and microbial theories seem to fail as causes, leaving only the non-radiation of heat from the body, hence "there is no such thing as sunstroke." Insufficient radiation is due to deficient evaporation from the skin or to deficient supply of cool air to the skin, and the former being more important, the relative humidity is "the foundation of the whole matter."

The heat rays from the sun may be the deciding and precipitating factor by adding the few fatal degrees to the body surface in hot and damp climates, where evaporation and radiation from the skin barely suffice to keep the body temperature below the dangerous point.

Here is one more contribution tending to establish the identity of heat affections, to eliminate mystery from their etiology, and to show that low relative humidity and perflation are the two prophylactics, in the absence of one of which the other may be depended upon as a most promising substitute.—(C. N. F.)

WETTUBELL, M. C., Capt., R. A. M. C. **The simple life.** Jour. Royal Army Med. Corps, Vol. XIX, No. 4, October, 1912.

In the service of a nation with whom congested and cirrhotic livers have long since attained remarkable frequency, the writer protests against the officer living in a mess which seems to require his eating more than the average man.

The effects of overencouragement of the stomach, described by Manson in his chapter on "Tropical liver," consequent upon the eight or ten absurdities of a mess parade lasting an hour and a half, prepared to tempt a palate which would refuse more simple viands, which is relieved in part only by those who take purgatives and special exercises to rid themselves of their surplus ingesta, is held responsible for a large amount of pessimism and mental lethargy among middle-aged officers.

At present marriage is the only escape for the subaltern not already confirmed in such habits, and if he wishes to cherish an optimistic outlook on life, "bread and cheese and kisses" is the infinitely more hygienic diet.—(C. N. F.)

TROPICAL MEDICINE.

E. R. STITT, Medical Inspector, United States Navy.

MANTEUFEL, DR., STABSARZT. **Notes on a hitherto unknown "Summer fever" of the German East African Coast.** Archiv f. Schiffs- und Tropen-Hygiene, Bd. 16, Heft 18, 1912.

Manteufel speaks of the great prevalence of malaria on the east coast and the necessarily constant thought of it in seeing any case of fever with indefinite symptoms. Relapsing fever and typhoid, both originally unknown to the region, must be differentiated.

He says that many fevers met with in natives and Europeans do not fit in our known category of diseases.

In 1911, in Daressalam, he met a series of cases beginning with an acutely rising fever of three to five days' duration and marked chiefly by severe prostration and slow convalescence compared with short duration of the disease. Less noticeable, but usual, were headache and disturbance of digestion—i. e., pains in abdomen, diarrhea, or constipation. Malaria was microscopically and therapeutically eliminated. The temperature returns early to normal without the use of quinine. The presence of typhoid in the neighborhood at the same time made comparison and exclusion easy, as with other prevalent diseases. The cases stopped with the onset of the rainy season, to return in the hot, dry months.

He claims an intermediary agent in a small gnat (Family *Psychodidae* genus *Phlebotomus*) found in abundance in the bed of one of the patients. Disease may be related to or identical with "Pappataci fever" (endemic gastric catarrh of dogs described by Doerr

and others in Herzegovina). The characteristic exanthem is missing, however, in "three-day fever," but it may have been overlooked.

He believes his epidemic, with previous ones in Daressalam and in Tanga, observed and described as dengue, to be identical with above, except that the exanthem has been prevalent in former instances. Moreover, dengue is not conveyed by gnats, but by culex fatigans.

It is admitted that association with a blood-sucking gnat is not established, but is merely a well-grounded conjecture.—(R. C. RANSDELL, PASSED ASSISTANT SURGEON, U. S. NAVY.)

ROST, DR. G. **Climatic bubo.** Archiv. f. Schiffs- und Tropen-Hygiene. Bd. 16. Nr. 20, 1912, pp. 667.

Certain statistics are given in the first part of the article, bringing out the preponderance of this affection in ships serving in the West Indies. Thus, for the West Indies, 11 to 17 per 1,000; for the Mediterranean, 0.7 to 2.9 per 1,000; China coast, 0.4 to 1.5.

Rost notes that Godding found the highest figures for the English Navy in the West Indies.

The author thinks that the period of incubation is a long one and quotes Cantlie, who had a case in which the period of incubation was probably four to five weeks, and also zur Verth, who observed the disease appear in cases of other diseases which had been under treatment for three weeks. Rost had a case in which he considered the period of incubation, the time elapsing since leaving port, to have been at least five weeks. He states that this extended incubation period explains those cases developing in more northern regions.

As to clinical manifestations, he quotes Ruge as considering a rapid development of the bubo as characteristic, while others, as Cantlie and Segard, hold to the view of a gradual increase in size. The author found the increase gradual and noted that at times the sailors only became aware of the bubo when the pain from the periadenitis attracted their attention; hence the name "fatigue glands." These glands are very hard and only slightly painful.

When these glands are incised there is no manifest pus production or disintegration. He quotes Woolley as having found endothelial cell hyperplasia with areas of fibrinoplastic exudate and coagulation necrosis, with both polymorphonuclears and macrophages present. Fleichner noted only an inflammation of the glands.

The overlying skin is not involved unless the periglandular tissues are attacked, in which cases we get a softening of the swelling and an inflammation of the skin. This softening, however, does not indicate suppuration in the center of the gland. Rost observed such suppuration in 18 per cent of his cases. He notes that involvement of both sides is relatively common (24 per cent).

The glands affected are almost always the inguinal ones, rarely the femoral (1 in 17 cases). The axillary or cervical glands are

almost never attacked. He notes the frequent involvement of the iliac glands (55 per cent).

In spite of the marked swelling, general symptoms are slight—some loss of appetite and moderate fever—unless suppuration supervenes. Zur Verth noted joint involvement in 4 out of 26 cases. Rost had one case with a marked anemia, which feature was noted by Godding.

The course of the disease is long drawn out, a period of weeks and months often elapsing before the swelling completely disappears.

The treatment was entirely symptomatic. When periadenitis was present, hot compresses and rest in bed were ordered. Rost was in doubt whether multiple puncture was of any benefit—it seemed probable, however, that it was of advantage, for, just as in the case of puncture with epididymitis, there was diminution of the pain.

Where the puncture shows the presence of pus in the glands this is aspirated and a 10 per cent glycerin emulsion of iodoform introduced. This procedure has displaced the knife in these buboes as well as in those resulting from soft chancre.

Bacteriological examination of the material from these buboes has not given any result. The use of the Burri method, as well as the Giemsa staining, did not show anything. He was unable to employ culture or inoculation methods. The Wassermann reaction was negative in three cases in which it was tried.

He notes that malaria, dysentery, "dhobie-itch," and pyogenic organisms, as well as the plague idea of Cantlie, have been advanced as causes.

Rost, noting that the glands involved are those in relation to the genitalia and that children are never infected, and that of his 17 cases all were in those who had indulged in the sexual act within the preceding two or three weeks, believes that the infecting agent resides chiefly in the vagina of prostitutes of the colored races in the localities where climatic bubo is frequently encountered. (E. R. S.)

SCHÜFFNER, DR. W. **The value of certain vermifuges in the treatment of ankylostomiasis.** Archiv. f. Schiffs- und Tropen-Hygiene. Bd. 16, 1912, pp. 569.

The author first made comparison between thymol and male fern. With male fern, 21 people lost 7 ankylostomes and not a single round worm. The next day, under thymol, 1,253 hookworms and 4 round worms were passed.

He then tried *Areca catechu*, and 20 worm-infested peole lost 6 hookworms and 7 round worms. With thymol on the subsequent day they lost 745 ankylostomes and 65 round worms.

Schüffner states that at first he gave 8 grams of thymol in 2-gram doses every 2 hours. Later he found that 4 or 5 grams given in 1-gram doses every 2 hours worked equally well.

He gives records of having twice obtained more than 1,200 worms, and on one occasion the expulsion of 1,496 worms followed thymol, which he considers the record number.

He notes the importance of a dose of salts before and after the thymol. That which in the article would seem dangerous advice is the use of castor oil after the administration of the thymol. He states that the warning of not giving oil with the thymol treatment on account of the solvent action of the oil may be right, but that given one or two hours after the last dose of thymol he has had only sure and mild action.

Comparing the eucalyptus-oil treatment with thymol, he found that 100 people lost 2,975 ankylostomes and 116 round worms with thymol and 469 hookworms and 5 round worms with the eucalyptus-oil treatment. He notes that the people object to taking the eucalyptus-oil treatment on account of the large amount of castor oil contained in the treatment, which induces vomiting.

He warns against giving thymol in cases of acute and subacute dysentery. He has seen several deaths occur in dysenterics as the result of the thymol treatment.

Schüffner notes that he has had but little experience with beta naphthol, but in six cases in which he tried it the result was satisfactory. He warns against the danger of giving beta naphthol to those with renal lesions.—(E. R. S.)

WALDOW, DR. **Quinine prophylaxis in malaria.** Archiv f. Schiffs- und Tropen-Hygieue, August, 1912.

The author states that quinine prophylaxis will keep the tropical resident from becoming incapacitated; of course, slight fever and a few ring forms in the blood may be present at times. He states that under quinine porphylaxis he has been perfectly well in the Tropics notwithstanding the fact that he has a latent malaria which shows itself from time to time in the form of neuralgias, etc., after being drenched in the rain. He has not seen blackwater fever or death occur in those who took quinine properly. He takes 1 gram every fourth day, and should neuralgias, malaise, headache, or slight rise of temperature occur he takes more than the standard dose. He recommends quinine tannate for those who can not take the usual salts of quinine. It must be remembered that 2.5 grams of the tannate equal 1 gram of the sulphate. Waldow has been unable to observe and of the degenerative changes in the leucocytes noted by Treutlein, who is the only one to report such changes in quinine prophylaxis. A strong point made by him is that while quinine prophylaxis protects against relapses, the mosquito protection does not. He gives an account of the insuperable difficulties he met with in trying to protect the crew of a warship from malaria by screening

of air ports, open hatches, etc. He considers such measures impracticable on a warship. Furthermore, he thinks that the loss of sleep and irritation incident to cutaneous manifestations when every window is screened and proper protection to ankles and face is carried out in the Tropics to be more productive of nervous irritability than would be brought about by the slight indisposition incident to the constant taking of quinine prophylactically.—(E. R. S.)

BORCHERS, DR. CARL. **Some observations upon the healing of wounds in sleeping-sickness patients.** Archiv f. Schiffs- und Tropen Hygiene. Bd. 16, 1912.

The author gives histories of four operations upon trypanosomiasis cases which had been previously treated with atoxyl and in which a cure was thought to have been obtained.

In two of these cases trypanosomes were found upon gland puncture. Case I was for radical cure of hernia; Case II for tendon suturing, following an incised wound of the foot; Case III, operation for removal of adenoids; and Case IV, a mastoid operation. All four cases were characterized by abundant secretion with pus formation and fever. Upon the administration of atoxyl all four wounds became healthy almost immediately. The author states that the striking response to atoxyl makes it a specific analogous to salvarsan in syphilis.—(E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

M. E. HIGGINS, Passed Assistant Surgeon, and G. F. CLARK, Passed Assistant Surgeon, United States Navy.

SCHÜFFNER, DR. W. **Structure of the posterior extremity in the female Ankylostoma and Necator.** Archiv. f. Schiffs- und Tropen-Hygiene. Bd. 16, Heft 20, 1912, pp. 700.

The author gives as the chief points of differentiation between the two species of hookworm of man the following:

Ankylostoma duodenale.	*Necator americanus.*
1. Buccal capsule equipped with four teeth.	1. No teeth, only lip-like processes.
2. Vulva situated posterior to the middle of the body.	2. Vulva anterior to mid-point.
3. The posterior extremity in the female is provided with a fine spine.	3. No projecting spine.
4. When contracted after death the head is curved in an opposite direction to the general curving of the body.	4. The head end is bent in the same direction as the general curving of the body.
5. With males the copulatory bursa bends in an opposite direction to that of the curve of the body.	5. The posterior extremity bends in the same direction as the body curve.
6. This species is thicker and longer than Necator.	

It is stated that by these three last points it is easy to separate large numbers of the two species. He states that the recognition of the teeth is the surest method of differentiating, but notes that this is not so simple, and that one may easily mistake the lips of Necator for teeth. The orientation of the mouth capsule can be made best by handling the worm floating in a Petri dish. In Deli (Sumatra) Necator is brought in by Javanese and Ankylostoma by Chinese coolies.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

BASS, C. C. and JOHNS, FOSTER M. **The cultivation of malarial plasmodia.** Journal of Experimental Medicine, October, 1912.

The blood in 10 to 20 c. c. quantities is taken from the patient's vein and received in a centrifuge tube which contains $\frac{1}{10}$ c. c. of 50 per cent glucose solution. A glass rod, or piece of tubing, extending to the bottom of the centrifuge tube is used to defibrinate the blood. After centrifugalizing there should be at least 1 inch of serum above the cell sediment. The parasites develop in the upper cell layer about $\frac{1}{50}$ to $\frac{1}{20}$ inch from the top. All of the parasites contained in deeper lying red cells die. To observe the development, red cells from this upper $\frac{1}{20}$-inch portion are drawn up with a capillary bulb pipette.

Should the cultivation of more than one generation be desired, the leucocyte upper layer must be carefully pipetted off, as the leucocytes immediately destroy the merozoites. Only the parasites within red cells escape phagocytosis. Sexual parasites are much more resistant, and the authors think they observed parthenogenesis. The temperature should be from 40 to 41° C. and strict anaerobic conditions observed. Estivo-autumnal organisms are more resistant than benign tertian ones. Dextrose seems to be an essential for the development of the parasites.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

FÜLLEBORN, DR. **The periodicity lacking microfilariae.** Archiv. f. Schiffs- und Tropen-Hygiene, August, 1912.

The author states that anatomically the filarial larvae of Samoa do not differ from *F. bancrofti*. It is possible that the absence of periodicity may be due to the characteristics of the transmitting agent, the *Stegomyia pseudoscutellaris*, which bites in the daytime. This is the common mosquito of the Samoan Islands. Thorpe's old view that the absence of periodicity was due to the irregular habits of the natives has no foundation. Fülleborn had opportunity to examine native Samoans in Hamburg. He took blood at 1 p. m. and 11 p. m. There was practically no difference in the numbers of

embryos per slide, and these people were then living an absolutely regular life. Children under 10 years of age were less frequently infected than adults.

He states that the species in Samoa is the *Filaria bancrofti*.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

NICOLL, DR. WILLIAM. **On the length of life of the rat-flea apart from its host.** British Medical Journal, October 12, 1912.

The author notes that under ordinary circumstances the rat-flea (*Ceratophyllus fasciatus*) passes through its developmental cycle in from two to three weeks. He notes that the Indian Plague Commission found that the Indian rat-flea (*Xenopsylla cheopis*) would remain alive for at least 41 days when fed on rat's blood, but only 27 and 20 days, respectively, when fed on human and guinea-pig blood. Without food, the duration of life was only 14 days when moisture was supplied, and only 6 days in the absence of moisture.

Nicoll found that the adult *Ceratophyllus fasciatus* rarely lives longer than three weeks when removed from his host, but with larval and pupal stages the length of life may be as much as a year.

From this it would seem that plague-infected fleas which had left their dead rat host would be dead within, as a limit, about one month.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

DOCHEZ, A. R. **The occurrence and virulence of pneumococci in the circulating blood during lobar pneumonia and the susceptibility of pneumococcus strains to univalent antipneumococcus serum.** The Journal of Experimental Medicine, Vol. XVI, No. 5, November 1, 1912.

The writer summarizes as follows: Thirty-seven cases of lobar pneumonia were studied. The pneumococcus was isolated from the blood in approximately 50 per cent of the cases. The course of the infection in individuals with pneumococcus in the blood was more severe than in those in which no organism could be cultivated from the blood. Seventy-seven per cent of the patients with positive blood cultures died; 79 per cent of patients with negative blood cultures recovered. In fatal cases of pneumonia, where the pneumococcus was found in the blood, the number of organisms per cubic centimeter of blood was very high in the last stage of the disease. In individuals dying of pneumonia without blood infection, the disease was characterized by a rapid spread of the local process in the lungs. It is probable that the symptoms of collapse, developing on the fifth or sixth day of lobar pneumonia, are often the expression of serious invasion of the blood by the pneumococcus. In other instances they mark an extension of the local process in the lungs.

Strains of pneumococcus, isolated from the blood of patients with lobar pneumonia were usually of high animal virulence. In a few instances, where the organism isolated from the blood was of low virulence for animals, the patients recovered.

A univalent antipneumococcus serum was tested against 19 strains of typical pneumococcus, and against four strains of closely allied organisms. The serum manifested some protection against 12 out of 19 strains of typical pneumococci. No protection was observed against the atypical organisms. In eight instances, the degree of protection obtained was high, in three low, and in one there appeared only a prolongation of the period of life of the inoculated animal.—(M. E. H.)

SCHWARTZ, HANS J., M. D. **The complement fixation test in the differential diagnosis of acute and chronic gonococcic arthritis.** American Journal of Medical Sciences, September, 1912.

The author refers to a previous paper, in the same journal for May, 1911, in which he had stated that in chronic gonorrhea, duration of six weeks or more, even though limited to the genito-urinary tract, an antibody, specific for the gonococcus, could be detected in the blood, and that, with the exception of cases of meningitis due to the meningococcus, a positive reaction denoted the presence or recent activity in the body of a focus of living gonococci. He also gave the technique for the reaction. It is carried out in a manner similar to the Wassermann reaction, using a salt solution extract of 10 to 12 strains of gonococci instead of the antigen usually employed in a test for syphilis.

In the first paper (May, 1911) he reported 324 cases, 7 of which were acute gonorrhea, with 6 negative and 1 positive reaction. Of the remaining 317 cases, 4 cases of chronic urethritis, showing gonococci, all gave positive reactions; 20 cases having no signs or symptoms of gonorrhea and giving negative histories all had negative reactions; 173 cases of chronic urethritis, chronic prostatitis, sterility, epididymitis, joint affections, gynecological cases, etc., having histories of gonorrhea, gave 131 positive and 42 negative reactions, while 130 such cases having doubtful histories of gonorrhea gave 45 positive and 85 negative reactions.

In his recent paper (September, 1912) Schwartz deals with the test as a means of making the differential diagnosis of gonorrheal arthritis. He reports 17 cases of arthritis in which gonococci were found, all giving positive reactions except one, which became positive after treatment by bacterins; 10 cases of gonococcic arthritis, treated by bacterins, all positive; 13 cases clinically diagnosed gonococcic arthritis, gonococci not found, 9 positive and 4 negative; 15 cases arthritis deformans, all negative; 23 cases acute rheumatic fever, all

negative; 3 cases rheumatic fever with gonorrhea, all positive; 18 cases for diagnosis, 10 positive and 8 negative; 11 cases of other joint affections, all negative.

It is interesting to note that E. L. Keyes, jr., M. D., states in the American Journal of the Medical Sciences, January, 1912, that the reaction proved wrong in 1 case out of 47.

It is felt that the reaction may prove of great value to the service in the diagnosis of cases of arthritis of doubtful origin.—(G. F. C.)

CALLISON, JAMES G., M. D. **A diluting fluid for standardization of vaccines with the hemocytometer.** Journal of Medical Research, Vol. XXVII, No. 2, November, 1912.

After reviewing the various procedures which have been used for the standardization of vaccines, the writer describes a technique which he regards as accurate and rapid of application, viz, the counting of bacteria with the hemocytometer. The most essential feature is the diluting fluid, and the one which is recommended is as follows:

Hydrochloric acid	2 c. c.
Bichloride of mercury (1-500)	100 c. c.
Acid fuchsin, 1 per cent aqueous solution q. s. to color.	

Add the fuchsin until the solution is a deep cherry red, and filter. The color should be just deep enough not to obscure the ruling on the hemocytometer stage. If too deep, filter again as each filtration removes some of the fuchsin.

The above solution remains clear and free from sediment, is a rapid and reliable germicide, allows of rapid sedimentation of the bacteria, and contains no solvent of the balsam with which the ruled stage is cemented to the slide.—(M. E. H.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, Passed Assistant Surgeon, and O. G. RUGE, Pharmacist, United States Navy.

KENDALL, A. I., and FARMER, C. J. **Studies in bacterial metabolism.** Jour. Biological Chemistry, Vol. XII, No. 3, September, 1912, and Vol. XIII, No. 1, October, 1912.

The series of nitrogen and reaction determinations of dextrose and dextrose-free bouillon in which had grown various bacteria for one, three, five, and eight days to show quantitatively the sparing action of carbohydrate for protein in culture media have been completed, and the results with different strains and certain other normal and pathological species from the gastro-intestinal tract have confirmed the findings reviewed in the last Bulletin (October, 1912, p. 613).

If sufficient dextrose be present only so much protein is utilized as appears to be required for structural metabolism, except in such

organisms as *B. alcaligenes*, which are "strictly carnivorous." "The proteolytic activity can be arrested by the presence of utilizable carbohydrate."

"Fermentation takes precedence over putrefaction," and by fermentation is meant "the action of microorganisms upon carbohydrate," while by putrefaction is meant "the action of microorganisms upon nitrogenous substances."

Bacteria, of course, require a certain amount of protein, from which they obtain the nitrogen for their own structure building and maintenance; but most of them can be forced to use carbohydrate for their vegetative (fuel) activities, which are attended by comparatively harmless nitrogen-free and acid rather than alkaline by-products, and consequent freedom from the toxins which render infections damaging.

Finally, the authors believe that this principle "is not limited to bacteria alone, but that it is in reality a general and fundamental principle of cellular metabolism." A novel and sound basis for bacterial chemistry, and perhaps for biological chemistry in general, has been elucidated, upon which students of biology must hereafter build.—(C. N. FISKE, SURGEON, U. S. NAVY.)

MEEKER, G. H., PHAR. D., LL. D. **Improvement in the technique of sampling urine for microscopic examination.** Jour. of the American Pharmaceutical Association, August, 1912.

Owing to the large chance for error in the usual methods of examining urinary sediments, the author has developed the following procedure, in order that all kinds of solid matter present may be demonstrated:

Shake the sample so as to make it homogeneous. Take two conical centrifuge tubes, each having a capacity of about 20 c. c. Label the tubes "a" and "b." Into each tube put about 15 c. c. urine. With the contents of "b" mix one drop of a 1 per cent solution of ammonia alum, followed by a drop or two of ammonia water, if necessary, to produce a faint alkalinity. Now rotate both tubes until sedimentation appears to be complete. Remove the tubes from the centrifuge and pour off the clear liquid. Next introduce a small, pointed pipette into the sediment and blow gently through the sediment. Using the pipette, transfer a drop of the turbid material to a slide. Again mix the sediment by blowing through the pipette, and again prepare a slide. We now have four slides—two from "a" and two from "b." To "a" now add one drop of any staining fluid desired and to "b" add a drop or two of an acidified staining liquid, or enough to dissolve the earthy phosphates and aluminum hydroxide present. Having allowed sufficient time for the staining action, prepare four more slides as described above. A cursory examination of the eight slides with the ⅔-inch objective and a more detailed examination of one or two of the slides under the ⅙-inch objective completes the study.

A few explanations follow: The two 15 c. c. samples taken from the well-shaken urine are each fully large enough to include in correct proportion all

of the kinds of suspended solids in the main specimen. The use of the alum in alkaline solution insures the formation of a coagulum which entangles and precipitates all morphologic elements of the urine and checks the findings in test tube "a." The sediment must be mixed before taking the drop upon the slide, because the solids do not settle uniformly.

The Determination of the Chemical Reaction of Urine.

Meeker believes that for accurate delimitation of the reaction of urine the eye needs a control color guide, and suggests the following method:

Half fill a small beaker with urine. Lay a clean white tile (or any other clean glazed surface) upon the table near the beaker. Take up two slips of red litmus paper—which for clearness in description we will call R 1 and R 2. Wet both slips of red litmus paper with neutral water. Lay R 1 upon the tile and hang R 2 against the side of the beaker so that the paper adheres to the beaker and is about two-thirds immersed in the urine. Take up two slips of blue litmus paper, B 1 and B 2, and proceed as with R 1 and R 2. After R 2 and B 2 have remained in the urine three minutes, remove them and lay them beside R 1 and B 1 on the tile. The order upon the tile should be R 1, R 2, B 2, B 1. The tints will now lie side by side and the eye can readily detect any color change that may have occurred. * * *

If an alkaline reaction be observed, it is important to determine whether or not the alkalinity is due to ammonium carbonate. To gain this information, heat the tile gently until the four slips of litmus paper upon it are thoroughly dried. If R 2, which had become bluish in the urine, regains its reddish tint by drying, then the alkalinity of the urine is due to ammonium carbonate. * * *

If R 2 becomes frankly blue, the urine is said to be sharply alkaline. If R 2 becomes but faintly bluish, the urine is said to be slightly alkaline. Similarly, when B 2 becomes frankly red or faintly reddish, the urine is said to be, respectively, sharply acid or faintly acid. It is my experience that in health the most common reaction for the mixed urine for 24 hours is the amphoteric reaction and not the acid reaction, as is customarily stated. * * *

The hands, if not washed carefully, are apt to have some unsuspected power to change the color of litmus paper." (O. G. R.)

TAPHANEL. **Surgical disinfection of the hands with iodine, followed by decolorization with sodium bisulphite.** Rep. de Pharm., 1912, p. 406. (Extract from Merck's Report, November, 1912.)

The surgical disinfection of the hands is well known, says Taphanel, but surgeons are disinclined to use iodine because it stains the skin. The skin so stained, however, may be decolorized by means of sodium bisulphite solution. The decolorizing effect of sodium bisulphite is also well known, but has not been utilized heretofore, and its use, moreover, has the advantage of adding its antiseptic action to that of the iodine; furthermore, sodium bisulphite has the property of suspending transpiration of the hands for an hour or an hour and a half, a transpiration that often compels surgeons to wash their hands during the course of an operation.—(O. G. R.)

MICHEL, F. **Detection of blood in urine and other physiological fluids.** Chem. Zeit., 1912, Vol. 36, 994–995.

The guaiacum test for blood is rendered more sensitive if a small quantity of pyridine is added to the urine or other fluid under examination. Five c. c. of urine are mixed with 1 c. c. of pyridine before the ozonized turpentine or hydrogen peroxide is added. The method is stated to be capable of detecting the presence of 1 part of blood in 200,000 parts of urine, and is carried out as follows: 25 c. c. of the filtered urine are treated with 5 c. c. of a 15 per cent $CaCl_2$ solution and heated to boiling. To the hot solution are added 5 c. c. of a 10 per cent sodium phosphate solution; the precipitate (consisting of calcium phosphate together with coagulated blood) is collected on a filter, washed with a small quantity of physiological salt solution, and a portion of it transferred to a strong, stoppered test tube. Three c. c. of water, 3 c. c. of pyridine, and a few drops of KOH solution are added, and the mixture is boiled. It is then shaken while hot, with an equal volume of 50 per cent KOH solution, the pyridine layer separated, again shaken with 50 per cent KOH solution and separated. This pyridine solution is now treated with an equal volume of glacial acetic acid, 0.5 c. c. of a leuco-malachite green solution and two drops of 1 per cent hydrogen peroxide. An intense green coloration develops if blood is present. Another portion of the calcium phosphate precipitate may be dissolved in a few drops of glacial acetic acid, treated with a small quantity of pyridine and then tested with the leuco-malachite green solution in the presence of hydrogen peroxide. In both tests the coloration must develop within two minutes and be of a deep tint; a faint green coloration, which does not indicate the presence of blood, is given by the calcium phosphate precipitate obtained from most normal urines.—(E. W. B.)

PAUL, T. **Chemistry of silver therapy.** Zeit. Elektrochem., 1912, Vol. 18, pp. 521–528.

The silver ion concentration in a number of silver preparations used in medicine has been determined in aqueous solution and in mixtures with blood serum. For use in infectious diseases and for other purposes a distinction must be drawn between the power of silver preparations to destroy germs and to hinder their development. The destructive action on germs depends chiefly on the concentration of silver ions in the solution and on the possibility of the formation of new silver ions; these factors are also of importance as regards the efficiency of the solution in hindering development.

When silver nitrate is added to blood serum, silver chloride is precipitated, and it is found that the Ag ion concentration in the serum is approximately the same as that in aqueous solution of sodium

chloride of the same concentration in this salt as blood or blood serum. Silver protein compounds are therefore less soluble than silver chloride, and by addition of sodium chloride are converted into silver chloride.

The effect of dilution on the Ag ion concentration in a number of commercial silver preparations has been determined, and the results are represented graphically. The Ag ion concentration increases with dilution in the case of argentamine, lysargin, collargol, and the silver-ammonia compounds, remains practically constant in the case of sophol, and in the case of protargol diminishes on dilution.—(E. W. B.)

JOLLES, A. **Sensitive test for the detection of albumin in urine.** Chem. Zeit., 1912, 36, 1108.

The reagent employed is prepared by dissolving 10 gms. of mercuric chloride, 20 gms. of citric acid, and 20 gms. of sodium chloride in 500 c. c. of water. Five c. c. of the filtered urine are placed in three test tubes; the first tube then receives the addition of 1 c. c. of 30 per cent acetic acid and 5 c. c. of the reagent. The second tube 1 c. c. of the acetic acid. Water is then added to the second and third tubes until they are filled to the same height as the first tube, and their contents mixed by shaking. On placing tube No. 3 between Nos. 1 and 2, a difference in the turbidity of the contents of the two latter is readily detected; in the presence of albumin and pus the contents of tube No. 1 will be more turbid than that of tube No. 2. The presence of mucin and nucleo-albumin may be detected by comparison with tube No. 3. An increase in the turbidity of the contents of tube No. 2, when diluted with water, indicates the presence of nucleo-albumin. The test will detect 1 part of albumin in 120,000 parts of urine.—(E. W. B.)

MURSCHHAUSER, H. and HIDDING, H. **The influence of dry and moist air on gaseous metabolism.** Biochem. Zeit., 1912, 42, 357–371.

The experiments were carried out in Murschhauser's respiration apparatus with special appliances for either saturating or drying the air. Guinea pigs of varying size were used and experiments at the temperatures of 5°, 20°, and 35° C. were carried out. After the experiments the animals were killed and the body surface measured. It was found that at 5° C. there was, as compared with the experiment at 20° C., an increase of 76.5 per cent CO_2 in dry air, and 82.8 per cent in moist air. At 35° C. as compared with experiments at 5° C. there was a decrease of CO_2 in dry air of 18.7 per cent, but an increase in moist air of 7.1 per cent. At 21° C. more CO_2 was pro-

duced in dry than in moist air. An explanation of the observed facts is given. At low and at medium temperatures, when the air is saturated with moisture, there is consequently less loss of heat. There must therefore be with increasing moisture at these temperatures a dimininution, and with increasing dryness an increase in the CO_2 production. Increase in the moisture up to saturation point at the higher temperature, on the other hand, causes an increased temperature of the body; which shows, as a consequence, an increase in the metabolism.—(E. W. B.)

HASI, P. and VON PESTHY, S. **Has the temperature of the blood any influence on the gaseous metabolism of man?** Biochem. Zeit., 1912, Vol. 44, p. 39.

A cooling of 0.25° C. to 0.8° C. in the body temperature results from ingestion of 1 liter of milk at 4° C. One liter at about 50° C. causes, however, a rise of temperature of 0.12° to 0.40° C., lasting for some time. Both the hot and cold milk cause an increased oxygen consumption of 13 to 15 per cent, lasting for three hours. In the case of the cold milk the increase continues for even some hours longer. This fact is apparently due to the longer time taken to empty the stomach after cold milk ingestion. From the result of experiment on one individual, it was found that almost twice as much nitrogen was excreted in the urine after cold than after hot milk.—(E. W. B.)

LOWE, W. F. **Estimation of dirt in milk.** Chem. News, 1912, Vol. 106, pp. 61–62.

The dirt which is present in certain samples of milk usually consists of cow dung, and several methods for its estimation have been proposed. In experiments carried out by the author it was found that when cow dung is added to milk, then separated by sedimentation, collected on a filter, washed, and weighed, the dry residue obtained only weighs about one-eighth of the weight of moist cow dung added. It was, however, ascertained as the result of further experiments that the volume of the sediment (in c. c.) was practically equal to the weight of the added cow dung (in gms.) and the author, therefore, employs the following method for the estimation:

Five hundred c. c. of milk are well mixed and placed in a cylinder, the lower end of which is drawn out and attached by means of a piece of rubber tubing to a small glass tube graduated in 0.01 c. c. The bottom of this tube is closed with a rubber stopper. After standing for about 15 hours the volume of the sediment is noted; the sediment is then removed and examined microscopically. It will usually be found to consist of undigested vegetable fiber and tissue stained yellowish with bile.—(E. W. B.)

EYE, EAR, NOSE, AND THROAT.

G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

COATES, GEO., F. R. C. S. **Chronic iridocyclitis.** (From Proceedings of Section of Ophthalmology, 18th meeting of the British Medical Association.) British Medical Journal, No. 2703, October 19, 1912.

The author reviews the several theories of chronic iridocyclitis:

First. Auto-intoxication from septic teeth, or from putrefaction in the intestinal canal. These causes are, in his opinion, hard to prove or disprove, since both states are common. The reliability of the indican reaction as an evidence of intestinal putrefaction had not been universally accepted.

Second. Keratitis punctata associated with heterochromia iridis and cataract, the iris of the affected eye being of lighter color. This type is of an extremely insidious nature. Fuchs is of the opinion that some unknown cause first hinders the acquisition of pigment, then later gives rise to the cyclitis. The cataract was held to be a secondary phenomenon. The author advances the opinion that the loss of pigment is due to a slowly progressing iridocyclitis.

Taking up another type of chronic iridocyclitis, sympathetic ophthalmitis, the prevalent opinion is that the disease is due to a living organism, and that the organism, either bacterium or protozoon, reaches the other eye by the general circulation and not by the nerve.

Elschnig attributed the disease to anaphalaxis, that owing to a breaking up of uveal tissue and an absorption of uveal pigment in the injured eye, a hypersensitiveness of the body tissues, especially of the other eye, was produced. Then, in the presence of any constitutional anomaly causing a weakness, the anaphalaxis would be effective and a sympathetic ophthalmitis would occur.

The author is inclined to the belief that a widespread infiltration usually of the whole uveal tract was the most characteristic feature, and doubted if Elschnig's idea could explain the cases in healthy and robust people.—(G. B. T.)

WRIGLEY, F. G., M. B. **The cerebrospinal fluid as an aid to diagnosis in suppurative meningitis of otitic origin.** Proceedings of the Royal Society of Medicine, Vol. V., No. 9,

When normal conditions exist the cerebrospinal fluid issues from the trocar drop by drop (one drop per second) under a pressure of from 20 to 30 m. m. of mercury, has a specific gravity of from 1.005 to 1.008, and is clear and colorless with an alkaline reaction. There is a faint haze on boiling, and on microscopic examination a few lymphocytes are usually seen, often in a state of disintegration. Two leucocytes to the miscroscopical field is normal. There are no bacteria.

In suppurative meningitis tension is increased, unless there is a thick basal exudate preventing free communication between the subarachnoid space at the base of the brain and that of the spinal cord. There is an increased albumin content and a polymorphonuclear leucocytosis. The fluid is cloudy, and bacteria are found either in smears or by cultures.

The bacteria most commonly found in meningitis of otitic origin are: Micrococcus catarrhalis, streptococci, staphylococci, bacillus coli communis, bacillus proteus vulgaris, and Friedlander's bacillus.

Suppurative meningitis may exist without bacteria being found in the cerebrospinal fluid, but the diagnosis can not be made with certainty.—(G. B. T.)

WHITMAN, LLOYD B. **Additional experiments on the excretion of hexamethylenamine in the ocular humors.** Archives of Ophthalmology, November, 1912, Vol. XLI, No. 6.

Taking up the work of Crowe and Gradle, the author has made the following observations, after using a saturated solution of the official hexamethylenamine and testing the vitreous as well as the aqueous humors. Rabbits were used in Gradle's cases.

1. Formaldehyde was present in aqueous and faintly in vitreous coli communis, bacillus proteus vulgaris, and Friedlander's bacillus.
2. The amount was greatly increased in both humors after one instillation of 10 per cent dionine solution.
3. The amount was markedly increased in both aqueous and vitreous when the eye was treated with one subconjunctival injection of normal salt solution.
4. Staphylococcus albus, from an enucleated panophthalmitic eye, and a test-tube culture of bacillus coli were inoculated into some of the forminized vitreous. They both multiplied in the incubator, but the growth was slower and thinner than would otherwise have been the case.
5. Crushed optic nerves responded very faintly to the test for formaldehyde.—(G. B. T.)

MISCELLANEOUS.

WICK, DR. W. **Care of surgical and laboratory instruments in the Tropics** Archiv f. Schiffs- und Tropen-Hygiene. Bd. 16, Heft. 20, 1912, pp. 710.

It is stated that while at home it is difficult to protect surgical instrument from rust, in the damp tropical climates it is only by special care that one prevents such instruments becoming useless.

Unpleasant surprise is apt to be in store for one who leaves the instruments he rarely uses in the special containers. All instruments

should be unpacked and kept in a glass cabinet so that they can be inspected daily.

Nickel instruments are the most satisfactory. They are, however, expensive and not suitable for all purposes. The instruments which are not used every day should be well dried, then rubbed with a mixture of equal parts of ether and alcohol, then dipped in liquid paraffin and put in the cabinet. Glycerin and vaseline are not so good, as they contain water. The great trouble with the paraffin is the difficulty of removing it. This is best done with the alcohol-ether mixture.

Instruments that are in daily use are best placed in a solution of soap in alcohol. By placing in 96 per cent alcohol before using, the slipperiness is gotten rid of. The author has used with advantage an air-tight container with calcium chloride to keep the instruments dry.

Aspirating and hypodermic needles should be of platinum iridium.

Rubber catheters and tubing should be of red or gray rubber and kept in a case where kinking is avoided. This case should be of sheet zinc and contain a dish of water and one of petroleum. The ordinary black rubber does not keep in the Tropics.

Microscopic objectives must be frequently dried. Cover glasses and slides must be kept in alcohol, alcohol-ether, or glycerin-alcohol to prevent frosting. Syringes with leather or asbestos packing are not suited to the Tropics. All glass syringes with platino-iridium needles are the proper ones for the Tropics.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

REPORTS AND LETTERS.

ADMINISTRATION OF TYPHOID PROPHYLACTIC AT THE NAVAL HOSPITAL, YOKOHAMA, JAPAN.

By E. M. Shipp, Surgeon, United States Navy.

In accordance with Navy Department General Order No. 133, typhoid prophylactic has been administered to all officers and enlisted men at this hospital, including also the student officers of the Navy and Marine Corps attached to the American embassy, who are under 45 years of age, or have not had a well-defined case of typhoid fever, or who have not previously been given typhoid prophylactic.

The typhoid prophylactic was adminstered in accordance with the directions set forth in War Department Circular No. 4, and with the exception of slight redness at the site of injection, and, in some cases, a mild headache, no reaction was noted excepting in the cases of two enlisted men, in whom severe chills with fever and sweating developed about three hours after the injections and continued for about five hours. There were contributory causes for the severity of the reactions in both cases, viz, the one after the second inoculation was probably due to heavy drinking on the day previous; the other, after the third inoculation, may have been due in part to a long walk which was taken, contrary to advice, shortly after the vaccine had been given.

In conjunction with the inoculations, the development of agglutinins was tested by Widal's method. The blood of 16 persons who were given the antityphoid vaccine was taken at varying intervals, also the blood of men having had typhoid fever, and of two individuals who had been inoculated with vaccine in November, 1911. The typhoid culture used for making the tests was obtained from Dr. Kitasato's laboratory in Tokyo and the transfers made in our laboratory. Agglutination averaged positive the tenth day after the first inoculation in dilutions of 1 in 100, rising rapidly, with a slight lapse between the eleventh and fourteenth days, to 1 in 500 on the seventeenth day and to 1 in 1,000 on the thirtieth day. Two old typhoid cases tested would not agglutinate in a dilution of 1 in 10. One case tested two months subsequent to the administration of the last dose was positive with a dilution of 1 in 300; two cases five months after receiving the antityphoid vaccine gave a positive Widal reaction in a dilution of 1 in 90.

From the foregoing it seems quite evident that the agglutinating power of the blood rapidly rises following the administration of the vaccine, and that the rise is much more rapid after the second than after the first injection. How long the high agglutinating power of the blood persists is a question, but judging from the findings in the cases under observation at this hospital, it very quickly recedes, beginning usually at the end of the first month and runs off until at the end of six months agglutination takes place in a dilution of 1 in 100. At no time was a negative phase encountered. In one person, although but 30 days after the first inoculation, a positive Widal was not obtained in a dilution above 1 in 300; this man had received, in May, 1909, one dose (1 c. c. of antityphoid vaccine), which inoculation may possibly have increased the cellular resistance to vaccine stimulation.

From a review of the available literature on this subject, it seems to have been well established that the Widal reaction becomes positive in from 5 to 10 days after the first dose of vaccine and grows stronger after the second and third doses, reaching its height in about 30 days following the last inoculation; further, that the reaction gradually weakens, but in some cases has persisted for one and two years, which is greater than after an attack of typhoid fever. The rapid fading of the blood's agglutinative power would seem to indicate the loss in about two years of what immunity is acquired.

In this connection the following abstract from an original article by Surg. T. Kabeshima, Imperial Japanese Navy, published in the Bulletin of the Naval Medical Association of Japan, entitled "Preventive Inoculation by the Combined Vaccine of Typhoid and Paratyphoid Bacilli," may be of interest. Surg. T. Kabeshima calls attention to the highly favorable effect on the prophylaxis of inoculation by typhoid and paratyphoid vaccine. After pointing out the definite relation between the prevalence of these diseases and the extent of inoculation in the Japanese Navy, based on close observation of cases admitted to naval hospitals during the last three years, he lays emphasis on the fact that the number of cases occurring among the uninoculated is eight times as large in typhoid fever patients, and ten times as great among paratyphoid A fever patients, as among the inoculated. Moreover, the death rate of the former is three times that of the latter in the case of typhoid fever patients, though no marked difference is observable among those suffering from paratyphoid A fever. In order to avoid the trouble and the consequent suffering to the patient, of performing three separate inoculations for typhoid and two kinds of paratyphoid fever, Dr. Kabeshima attempted an inoculation with vaccine made from a combination of the three kinds of bacilli. By preliminary experiments on animals

he ascertained the degree of immunity against the individual bacteria by this method of inoculation, after which he proceeded to test it on human beings, more than 300 men being inoculated. He was convinced by the experiment that a comparatively large dose of the bacteria contained in the vaccine does not to any marked degree influence the reaction accompanying the inoculation, and that 15 to 20 c. c. of the serum drawn from 20 inoculated persons protects a mouse against three times the lethal dose of each bacillus. To this extent, then, he advocates the reasonableness and advisability of inoculating with the combined vaccine.

In conclusion, I desire to state that all of the laboratory work in connection with the 16 cases referred to in this report has been conducted by Asst. Surg. G. E. Thomas, United States Navy, who is attached to this hospital.

REPORT OF LABORATORY WORK PERFORMED AT CAÑACAO NAVAL HOSPITAL.[1]

By C. S. Butler, Surgeon, United States Navy.

During the year 1911 the laboratory has autopsied nearly all the rats caught on the reservation and examined them for ecto and endo parasites. Many of these animals have shown interesting pathological conditions, such as tumors of the kidney or occasionally a skin disease, giving them a "moth-eaten" appearance. Some of these rats have been examined for rat leprosy, but apparently the lesion in question is not due to the leprotic condition. Ecto and endo parasites of rats in Cañacao are similar to those we have in the United States.

There are two points that are noteworthy, one of which has bearing on the public health. One is that trichina infection of rats does not exist in Cañacao and probably not in Luzon. The other point is that there is almost constantly present in the small intestine of rats a small nematode worm which so far as can be made out has not been identified. The protozoa present do not differ generically from rat protozoa generally. Rat trypanosomes (*T. lewisi*) are frequently found.

In regard to the destruction of rats, where they can not be "built out" by rat proofing, constant trapping and the keeping of cats are the most effective means. The latter expedient has proved entirely satisfactory at the supply depot, formerly greatly troubled with rats. In some places, as, for instance, the hospital galley, it is not expedient to use cats, so that trapping in that case is the best method.

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[1] Extract from Sanitary Report for 1911 from United States Naval Hospital, Cañacao, P. I. By N. J. Blackwood, surgeon, U. S. Navy.

Feces.—There have been recorded during the year 1,662 examinations of feces. Many of these were cultural (for protozoa or bacteria), others, and the majority, were microscopical simply. Where cultures were made for entamebæ it was with few exceptions that they were positive, and these (the positive cultural ones) did not necessarily show vegetative amebæ in the stools. The explanation of this is, it is believed, that the parasitic organisms are not saprozoic and that the organisms growing on the plates are the harmless outside amebae whose cysts, swallowed with the food or drink, have gone through the intestinal canal in a viable condition. We have seen many specimens of feces in which were vegetative amebae in abundance, but no symptoms of dysentery in the individual, and most of these specimens, planted, would fail to show culture. There are two explanations of this: First, that these amebæ were pathogenic, but had not found conditions favorable for so disturbing the intestine as to give clinical dysentery; second, that those amebæ were the harmless entamebæ coli which will not grow on plates.

This latter explanation is, in my opinion, the proper one in the majority of cases, as nearly one-half of all the people here show amebic organisms, while the number of cases of amebic (also of bacillary) dysentery are, by statistics, on the decrease.

Of other water-borne diseases of the intestinal tract, there have been no cases of cholera in Cavite Province during the past year and only one diagnosis of typhoid fever has been made in this laboratory. There is an extremely small percentage of typhoid here and most all the cases are among the natives. The probable explanation of this is that Americans use only the best of water obtainable, and that there is a great scarcity of the domestic fly. Owing to the uncleanly habits of the native population it is very probable that most all typhoid is due to contact.

Of the helminthic infections, ascaris, trichiurus, and hookworm are the common ones. We have found one or two enlisted men infected with *T. saginata* and also a few with *Hymenolepis nana.* One native child was found to harbor *T. saginata.*

Sputum.—There have been recorded 216 examinations of sputum. Among the native population tuberculosis of all forms, but especially pulmonary, is common, and pneumonia occurs frequently, although these latter cases are rarely seen at the native clinic. No infections with the lung fluke have been found, although the sputum examinations have been made with this as a possible finding.

Urine.—There have been 1,820 examinations of urine. Many of these required complete chemical and bacteriological reports, but the majority were the ordinary chemical and microscopical examinations. There has been nothing out of the ordinary run of genito-urinary

conditions noted in these examinations. Bilharzial disease, so far as I am aware, has not been described for the Philippines.

Wassermann tests.—In the Wassermann test (1,463 of which have been completed during the year), as done in the hospital laboratory, the technique of Emery, slightly modified, is employed. This test makes some mistakes, but if carefully done is the most wieldy of the several modifications of the Wassermann. Employed upon the natives coming to the clinic, it has shown that about 14 to 18 per cent of them have latent or active syphilis. Nearly all of the chronic ulcerations so common among the natives have syphilis as the underlying dyscrasia.

This test, tried upon 106 lepers at San Lazro, showed about the same percentage of positives as among the natives applying for treatment at the clinic. The results of this test have been generally satisfactory to the medical officers having charge of the wards.

Blood examinations.—There have been 2,714 blood examinations made, not including blood cultures. These tests were greatly facilitated by Stitt's method of counting, differentiation, and determination of parasites all in the same preparation. One of the interesting things connected with this blood work has been the extremely low white counts which occur in dengue (of which there is a large incidence in the wet season). The diagnosis of dengue can be made by this feature alone. Counts as low as 2,000 are common and there is usually a relative decrease in polynuclears with an increase in lymphocytes.

There have been a few cases of malaria found at the laboratory, and most of these were of benign tertian. Malaria is not at all common here, and there have been no cases of filariasis during 1911.

Miscellaneous examinations.—This includes examinations of urethral smears, tuberculin tests, and other procedures of that class. There were 720 of these during 1911.

Water supply.—This artesian water contains an organism which in culture will ferment glucose with abundant gas production and lactose slightly, but it is not the colon bacillus. It is a chromogenic organism, which occurs in almost pure culture. This water also shows protozoa on culture. In spite of these two findings, the water, in my opinion, is potable. As to the application of the *B. coli* test, it can be definitely stated that the organism causing the fermentation is not *B. coli*, and as to the growth of protozoa, this can not be used as a standard of potability in a water, since the pathogenic varieties of protozoa will not grow in artificial culture and it is practically impossible to get any water in this vicinity from which protozoa can not be grown.

Clemensha, Aiyer, and Mudaliyar have shown that for India the colon test must be used with a great deal of caution in the Tropics,

There are bacteria which are not necessarily fecal at all, but which give culture characters like those of *B. coli.*

The environs of the hospital well are far better than those of the San Roque artesian well, which is in a dusty, open plaza, and yet the water from this latter source shows no fermentation of sugar, even in large amounts.

Mosquitoes and other insects.—The prevalent mosquito on the hospital reservation is *Culex microannulatus.* There appears to be no genera of the anophelinae breeding here. No stegomyia species, so far as I am aware, have been taken on the hospital reservation.

A minute midge (one of the Chironomidae) was found in the hospital by Dr. Stitt last August. Dr. Banks stated that this was the first time this bloodsucker had been reported from the Philippine Islands.

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UNDER THE SUPERVISION OF

SURGEON GENERAL C. F. STOKES
U. S. NAVY

EDITED BY

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AND

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This United States Naval Medical Bulletin is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

C. F. Stokes,
Surgeon General, U. S. N.

U.S. NAVAL MEDICAL BULLETIN.

VOL. 7. APRIL, 1913. No. 2.

SPECIAL ARTICLES.

MENTAL AND MORAL TRAINING FOR WAR.[1]

By J. F. LEYS, surgeon, United States Navy.

In a lecture[2] delivered before the War College conference by Prof. Hugo Munsterberg in June, 1912, the psychological conditions existing in war were described.

In the preparation of this paper an attempt is made to arrive, if possible, at some conclusions which may be of a practical character. Interesting as the subject of mass psychology is, it can have no value in this course if its interest is purely academic. The question for us is: In the preparation for war can anything be done in the way of mental and moral training which will, under the psychological conditions of war, contribute to our success in arms? Apparently some preparation of this sort is possible.

The preparation of the individual for war begins long before his enlistment in the armed forces of the country or his attainment of adult age. Lieut. Col. Montaigne, of the French general staff, says: "The preparation of a race for war is made by its mothers and its schoolmasters." And in another connection he states that war in its essence is not an art or a science but a morality (*moralité*) ; that is, a moral system or idea. This is true or it is not true. War is right or it is wrong. It is necessary or it is unnecessary. Under our free institutions every individual, educated or uneducated, will not only have his opinion but will freely express it. But that war is necessary and right is the opinion based upon history. The contrary opinion is at variance with the dominant fact in all history, that the racial progress and national development of mankind have been accomplished with the waging of war and by it. A theory that the same progress might have been accomplished without war is unten-

[1] Lecture delivered at the summer conference, U. S. Naval War College, Newport, R. I., Sept. 18, 1912. Reprinted from the United States Naval Institute Proceedings, vol. 38, No. 4, whole No. 144.

[2] In archives, Naval War College, and published in North American Review, vol. 197, No. 2, February, 1913.

able, because it is nothing but a theory, based on no fact. With this moral philosophy of war the biological law of evolution is entirely in accord. "It is the destiny of the weaker to serve as food for the stronger, the purpose which the weaker exists to fulfill. The stronger develops its strength in conquering the weaker, and this is *its* destiny. Might is right" (Montaigne). This is not a mere political theory. It is a biological fact.

It behooves us, then, in our national preparation for war to look to our schools. Are our children receiving in the majority of our schools, public and private, the sound teaching, supported by history and biology, that war is inevitable, necessary, right, a moral idea? Field Marshal Count Moltke says:

> Selfish and worldly activity, looking only toward the gratification of all desires of the individual, undermines the foundations of higher moral philosophy and the belief in ideals. Fools arrive at the vain conclusion that the life object of the individual is acquisition and enjoyment; that the purpose of the state is simply to facilitate the business affairs of its citizens; that man is appointed by an all-wise Providence to buy cheaply and sell at a profit; they conclude that war, which interferes with these activities, is the greatest evil.

It is to be feared that too many of our children are receiving either such false teaching or no teaching at all. Too many of our boys attend schools where virile influences are lacking. Coeducation of the sexes is carried too far up in age. Boys should not be taught to so large an extent by spinsters. Boys should go to school to men and girls to women. The revival of the schoolmaster as an honorable, honored, and well-paid position for the highly and soundly educated man is a national need of direct importance to the future security and defense of the Nation.

The pulpit and the newspaper are the schoolmasters of the great mass of our adult citizenship. It can not be said that either of these influences tends, upon the whole, to inculcate a sound morality with regard to war.

Under the freedom of this Government any private individual or association, society or sect has the right, at its own expense, to maintain schools in which its own sons may be brought into a feministic atmosphere and taught an individualistic philosophy, and to employ teachers as incompetent as it pleases. But it is still true that the very large majority of the present active generation of our tax-paying and voting citizens are as level headed and right thinking as the citizenship of any other country. The whole public, which supports the public schools, has a right to demand, and, if its active interest in this particular matter could be aroused, I believe that it would demand, that public funds should not be expended in public schools for the employment of persons who, through insufficient education or personal bias, are incapable of giving instruction which squares with the teachings of history and the facts of daily life.

Sound teaching in the individual's relation to the state and in his duty to support and defend it should be required, the unsound teachings of mere individualism should be prohibited, and the teacher unable or unwilling to teach in a State school in accordance with principles approved by the State should be considered incompetent and disqualified.

The Navy League might properly concern itself with this aspect of public education, and it might well bring such wholesome influence to bear as it can upon other departments of the Federal Government in this connection. Its attention is invited to a recent publication by the Bureau of Education, at Washington, in its Bulletin No. 8 of 1912.

No one will gainsay now that mental equipment and training for the operations of war is at least quite as important as material preparation. That is the very meaning of the existence of this War College.

Napoleon stated that "in war the moral is to the physical as 3 to 1." A similar opinion seems to have been held by the highest authorities on the subject of war in all times and countries. Anyone who would venture to hold a different opinion should be able to give reasons.

Col. Montaigne says: "Force is not the number of the personnel nor the sum of the material; it is 'la vertu.'" *Virtue* is here used not in a narrow sense but in the broad sense of the Latin *virtus*, manly excellence. So, too, the word *morale*, Latin *mores*, meaning both manners and morals, is used in the broad sense of the Wykhamites, whose motto is "Maners makyth Man."

Clausewitz says: "To what would a theory of war degenerate which left the moral qualities out of consideration? To a mere military arithmetic or a military geometry—that is to say, to a nonsense." Guibert says: "Every battle is a moral battle."

The subject of mental and moral training for war seems to fall naturally into the following divisions:

(1) The training of the individual, whether officer or man, largely a self-training.

(2) The training of the officer as such.

(3) Training and control by officers of the body of men under their command.

(1) Col. Montaigne says:

> The preparation of the soldier for war is to make him hardened against fatigue, insensible to suffering, ready for death. He should enter battle with no mercy for himself and none for his enemy. To eliminate fear he must train himself to despise his own destruction and to be ready to sacrifice himself.

This author (Montaigne) devotes the first 101 royal octavo pages of his book to the subject of fear and a considerable number more to

means of overcoming it. He says that a leader may well be more concerned with the dread of fear than with the dread of danger. His conclusion is that the cure for fear and its effects upon the rank and file is in the awe of authority. The remedy for "la peur" in troops is "la crainte," impressed by the severest discipline. Whatever the *applicability* of this idea in other races and under other governments, it is not applied, not practiced, probably not available as a means of controlling or eliminating fear in American troops or naval forces. And it does not seem to me the logical answer to the problem of eliminating fear, and more definitely the fear of death. It is a purely artificial method to employ, and it appears likely in most cases to fail.

Nine-tenths of all fear is the dread of the unknown. Nine-tenths of all fear is eliminated when the unknown becomes known. Suddenly placed in an unaccustomed environment with unknown forces in play around him, the possible effects of which at any moment may be injurious or painful, the individual is possessed by fear. Persons of nervous temperament are more accessible to this influence of the unknown or unaccustomed than those of phlegmatic temperament, but none are quite free from this fear of the unknown. The liability to fear of the unknown and the reflex effects of fear are physical conditons largely beyond direct control by the higher consciousness. Illustrations could be multiplied indefinitely. The fear of the dark and unfamiliar road which disappears as it becomes an accustomed walk, the fainting of the strong man at the sight of his own blood shed in the smallest quantity and even painlessly by the surgeon's lancet, though the same man will undergo the most painful ministrations of the dentist with the nature and extent of whose work he is more familiar, the ducking of a soldier or sailor as a shell hurtles overhead in his first battle, though he sees the absurdity of such a movement with further experience and better knowledge. Fear is removed by familiarity, by knowing the facts. A knowledge of the actual facts concerning death should serve to remove all dread of death as a personally painful experience, for it is not so. The termination of the life processes as a consequence of disease or injury is not a painful phenomenon. It has suited poets, romancers, and to some extent religious preachers so to misrepresent it. To the extent that they have done this it has been part of their stock in trade. But this is pure fiction. It is not the stuff with which to feed up the mind that we would make sound and strong. The fact is quite the contrary of this. I have seen a very considerable number of men dying, perhaps as many as 200, and I have never seen a dying man afraid to die, nor a final dissolution that was painful. I have compared notes on this subject with many physicians and have always found their experience the same. The fear of death in itself is a fear of the un-

known, fed upon false teachings and not justified by any fact. The attitude of the sound and well-regulated mind should be that death may be undesirable and inconvenient for business reasons of a personal or domestic nature; that is all. The naval or military man should make his property secure, take out necessary insurance, make his will, and as far as possible remove anxiety for those dependent on him as a factor tending to disturb his equanimity in approaching hazardous duty. Death will not hurt him personally at the time, nor will he experience any subsequent ill effects from the occurrence.

The mentality of man has a physical basis. Mental processes are a function of certain cells. There is no function, secretion, motor discharge, or efferent impulse of any kind from a cell except in obedience to the stimulus of an afferent impulse of some kind reaching that cell. All activity is reflex, none is spontaneous, as non-biologists are too apt to suppose. That many actions are reflex is taught in the elementary schools and is well known to the laity, but it is not so well known that all vital action in living animals is so. The reason this is so is a fundamental one. It rests upon the cell doctrine of life. Man is but a community of highly specialized individual cells. The cells of his brain and nervous system are cells in which the fundamental vital property of irritability, common to all cells, has been highly specialized. The activity of the mind, like every other vital process, is a cell function. A man can not do anything his cells can not do, for he is nothing but a mass of specialized cells. Mental health and strength have the same kind of physical basis as powers of a grosser sort.

If you approach the problem of developing and maintaining your individual efficiency with these fundamental facts clear to you, the relation of a cell poison such as alcohol to your efficiency will be clearer than any moralist who confines his arguments to the abstract can make it. Von Moltke said " Beer is a more dangerous enemy to Germany than all the armies of France."

The higher centers, the centers of conscious mind, take cognizance of many actions, choosing and controlling the motor discharge with which response is made to the afferent stimulus received. But when the same afferent impulse leads many times to the same motor discharge, habit is established, the higher centers cease to exercise attention to the action, and to choose, direct, or modify the motor discharge. Such habitual reflexes are said to be carried out by the subconscious mind without the cognizance and control of the conscious mind. This talk of conscious mind and subconscious mind is a mere *façon de parler*, the jargon of psychology, a convenient formula used because it serves well for purposes of discussion, just as the atomic theory serves in chemistry.

Conscious mind (i. e., the higher centers) may be off the job by reason of complete suspension, as in sleep, in the hypnotized state, or in some forms of mental disease. Or it may be off the job because it is being constantly diverted by new impressions, or so disturbed and depressed by fear as to be incapable of functioning in the government of action.

It is here that the value of habit in the individual appears. Under these circumstances, with his higher consciousness benumbed and his judgment suspended, the undisciplined individual will, on the receipt of an afferent impulse, either do nothing or he will do a wrong thing. But if discipline has established in him a habit; if his lower centers, on the receipt of an auditory afferent impulse, the bugle call or the word of command, are habituated to giving the appropriate motor discharge, he advances, takes his station, or fires, though his higher mental functions may be in a condition of suspension or of distraction.

(2) We have now to consider the psychology of the individual officer who is to control the mass of personnel and material, and upon whose individual capacity and staunchness the issue of battle depends. It is upon his moral force, his morale in the broadest sense, his virtue (virtus) that the issue rests.

Few men are essential or incurable cowards. Brute courage, so-called, freedom from any serious fear of pain or death, is a fairly common commodity, and fairly cheap. You can get it in the market in quantities as required for about $15 a month, and of a quality which will probably not fail you in the hour of need.

Most men, unrestrained by law, will fight, even against odds, for what they want. With moral courage, developed by discipline, they will fight for the rights of others and sacrifice themselves. But this courage and the higher manifestations of courage which make up the man's total moral efficiency, or morale, and all of a man's moral and mental activities no less than his so-called physical activities have a physical basis.

The activities of his brain are arrested or vitiated by disease as promptly as the activities of his muscles.

The importance of staunchness, self-control, and readiness for self-sacrifice, and of good habits in general, is sufficiently emphasized by all authorities on military responsibility and conduct. As to the idea of a special genius for war, Clausewitz disposes of this with the opinion that the phrase has no special meaning, that in connection with war the word "genius" is to be taken only in its ordinary sense, "a very high mental capacity for certain employments."

Lieut. Col. Foch, of the French general staff, states that the first trait to be developed in the mental training of the officer is subordination and the second initiative, no less necessary than the first—that initiative defined by Von der Goltz as "The manifestation of the will

power of the individual, backed with sound judgment and acting in accordance with the plans of superior authority."

The importance of the study of the art of war needs no emphasis here. Every officer who has had the advantage of the War College course in recent years appreciates at its full value the fact that the mental processes exercised and made familiar and habitual by the strategic game and those which would be required in the strategy of actual war are identical. The mental training involved in this course is therefore of the highest practical value to the officer who will be charged with responsibility in the prosecution of war. The factors which must be considered in war will range themselves in proper sequence in the mind habituated so to deal with them.

Concerning the effect of the events of war upon the mind (the higher centers), Clausewitz says:

> In war, owing to the many and powerful impressions to which the mind is exposed and in the uncertainty of all knowledge and of all science, more things occur to distract a man from the road he has entered upon, to make him doubt himself and others, than in any other human activity. * * *
>
> * * * Often nothing else will help us but an imperative maxim which, independent of reflection, at once controls it; that maxim is, in all doubtful cases, to adhere to the first opinion, and not to give it up until a clear conviction forces us to do so. We must firmly believe in the superior authority of well-tried maxims, and under the dazzling influence of momentary events not forget that their value is of an inferior stamp.

The necessity of bearing in mind and acting upon this principle has been illustrated in at least one of the problems played out here this summer.

In concluding this part of the subject, which has to do with the mental training of the officer, a difference may be pointed out between the conditions surrounding the commander in chief of land forces and those in which the commander in chief of naval forces must often exercise his highest faculties to arrive at reasoned decision. Clausewitz says:

> So far as the enemy's activity affects the general directly in the matter of danger to his person, this is a factor which plainly diminishes the higher the rank of the commander. To what does this factor amount for one in the post of commander in chief? It is nothing.

It is plain that the disturbing factor of immediate personal danger will very often be brought to bear upon the naval commander in chief in action, though his most important mental labors will have been discharged, under modern conditions, before battle is joined.

(3) We now come to the third and last subdivision of our subject—the training and control by officers of the body of men under their command. And here, again, naval conditions are in important respects different from those obtaining with land forces. There is little danger of panic in the crew of a modern ship on the way into action.

The men below who propel the ship as ordered are not exposed to those impressions which startle the senses, strike with fear, and make for panic in land forces advancing into battle. The commanding authority directs the course. Explosive sounds overhead and about the ship have been made familiar by target practice and have long ceased to be in themselves disturbing. The evolutions of battle practice reproduce with almost perfect similarity the conditions of actual battle. The habit of fixed attention on his proper duties is well developed in each individual, and the strain and fatigue are much the same. The individual who might be seized with panic has no chance to bolt to the rear and be followed by others.

Remember the points of mass psychology, explained more in detail by every writer on this subject. The psychological characteristics of the crowd, whether a theater audience, a mob, a regiment, or a ship's crew, or any other close collection of men brought together by some common interest are:

First, a suspension of the sense of individual responsibility.

Second, an increased susceptibility to suggestion.

Translated into physiological terms, this means that the receipt by the lower centers of the necessary afferent impulse will give rise to an efferent discharge (action) without review and check by the higher centers, which would regulate the action according to reason but for the fact that, in the psychology of the mass, they, the higher centers, are in suspension, prevented from functioning.

In dealing with the mass of men under orders we have to take every precaution that selection and training can give, that they shall not receive and act upon a wrong suggestion at the critical time. Such a suggestion might be received from gruesome sights to which they are not accustomed.

The physical reflex action (in the direction of panic) which may be produced by the sight of bloodshed, or of mangled bodies, is not a reasoned action controlled by the higher centers. It is not caused by a reasoned feeling of danger to his own person, a fear that similar injury may at any moment overtake himself. It is entirely independent of this. It is not an intellectual fear, but a purely unreasoning, involuntary, physical reflex, produced by the unfamiliar. It is what I have already called the fear of the unknown. Precisely the same physical reflex is seen in many medical students at their first surgical clinic, where it is evidently not caused by the presence of any danger to their own persons. Nor is it the effect of sympathy with the sufferings of others. The same physical reflex will be produced in 9 out of 10 normally strong men who are taken into a dissecting room at night for the first time. The intellect will ridicule and repudiate such a condition, before, during, and after the visit, for it

has no intellectual basis or justification, but it is there, a physiological reflex, a definite, tangible, physical condition.

These facts indicate that our solution of this end of the psychological problem, how to deal with the mass to be led, lies along these lines.

First. Eliminate as far as possible the fear of the unknown. This is largely accomplished by making familiar, as far as possible, the physical environment of war, which if unfamiliar would tend to astonish and startle the nervous system. Fleet evolutions tend to fortify the mind, unconsciously to itself, against the fear of collision or ramming, or of undetected approach for torpedo attack. Target practice gives familiarity with noise, recoil, the hurtling sound of the shell in the air, all of which would disturb the senses if unfamiliar.

The idea emphasized by the Surgeon General in his address here a year ago, that each battery group in the ship should be made as self-sustaining as possible in the matter of first aid to its own members, both as regards material supplied and skill in its use; and that the medical force of the ship should, as far as possible, go about during the battle and relieve visible suffering, and relieve the men at work from the disturbing effect of gruesome sights; this principle probably has a high psychological importance for efficiency in battle.

Second. With a ship's company so well familiarized with fleet exercises and target practice as our men are, it is probable that the first phenomenon noted as characteristic of mass or mob psychology would not, in a naval action, come to the fore to be reckoned with, namely, a suspension of the sense of individual responsibility. But the other important psychological mass effect would probably be present, namely, increased susceptibility to suggestion.

It would be well to accept this as a basis for action, and the action indicated might well have a practical value, especially for the personnel of all those units not in the first line, who would be kept for a time in the suspense of waiting. To make advantageous use of this psychological condition it is necessary to remember what has been proved by laboratory experiments. In normal suggestibility—whether of the individual or of the mass—suggestion may be successfully made by repetition, by frequency, by last impression.

(1) By repetition we mean technically the repeating of the suggestion again and again without other impressions intervening.

(2) By frequency we mean repetitions at intervals and separated by other impressions. Frequency is three times as powerful for effect as repetition.

(3) Last impression. Of several impressions the last is most likely to be acted upon. Last impression is five times as powerful for effect as repetition and nearly twice as powerful as frequency.

The strongest suggestion is obtained by a combination of frequency and last impression.

The application of these principles would be as follows: In a destroyer standing by for her opportunity to make torpedo attack, the officers repeat from time to time, "We'll have them just where we want them by and by." This and similar suggestions are frequently made. When the time has come to advance to the attack the order for speed and helm is accompanied with the suggestion, "Now we've got them." Under such conditions each man will be inspired by the suggested confidence in the result.

A FEW REMARKS ON THE DETENTION AND PROBATION SYSTEM OF PUNISHMENT, AND A CLASSIFICATION OF THE OFFENSES OF THE PERSONNEL OF THE UNITED STATES NAVAL DISCIPLINARY BARRACKS.

By W. L. Mann, passed assistant surgeon, United States Navy.

Formerly it was the custom of the Navy to punish military offenders and the criminal class in the same penal institutions. For the primary purpose of separating these two classes the Government has recently established the United States Naval Disciplinary Barracks at Port Royal, S. C., for the control, correction, and punishment of those convicted of military offenses. Realizing that certain military crimes are often caused by carelessness and inexperience, and that the culprits, after treatment with disciplinary measures, are very often desirable for further retention in the service, a new system of administration of punishment has been inaugurated.

This system involves certain principles of modern penology, and briefly outlined is as follows: Upon arrival at this station the convicted individual is designated as a "detentioner" and is confined in the detention barracks. The detentioners perform manual labor, but in addition they are regularly drilled and instructed; briefly expressed, an endeavor is made to make punitive measures subservient to reformation. The probation system, "the latest and most beneficent product of penological science," is now utilized. After serving two-thirds of the sentence as a detentioner, provided his conduct warrants the change, he is advanced to the probation barracks and becomes a "probationer." The probationers serve the remaining third of their sentence under identical conditions and privileges as regular duty men, and if their conduct continues excellent they are eventually restored to the service. If at any time during their sojurn at this place the individual manifests inaptitude for the service by reason of his conduct, he is required to complete the total sentence in detention, and upon expiration of this period is discharged from the service. The principle of the "indeterminate sentence" is partly

involved by the discharge of probationers upon the expiration of their enlistment.

The isolation, the mild, equable climate, and other conditions make this station a very desirable location for the application of the above methods. The commodious buildings of an abandoned navy yard afford ample facilities for barracks, quarters, recreation hall, etc.

OBJECTS OF THE DETENTION-PROBATION SYSTEM.

These are threefold, and may be considered as corresponding to three processes in medicine—diagnosis, prophylaxis, and therapeutics. The utilization of the probation system automatically diagnoses the undesirable from the desirable. The return of a former probationer on board ship is assumed by the recitation of his experience at this place to partially deter others from violation of military discipline, and the detergent action of the immediate separation and the final discharge of the undesirable further assists this prophylactic process. The early diagnosis of the potentially capable permits the therapeutic application of corrective measures by the maintenance of physical equilibrium, the restoration of mental balance, and the instillation of moral principle.

This place furthermore combines the functions of three separate institutions—punishment, reformation, and instruction. These three functions are not essentially different, but vary from each other in "degree"[1] only. Correction and elevation of efficiency should be the direct and paramount aim of all penal and educational establishments.

A FEW SUGGESTIONS.

Commanding officers are authorized to recommend the discharge of such men as should be discharged for undesirability, inaptitude, and unfitness, but they are cautioned "that those who are not very promising in the early stages of their service frequently developed into the most valuable men on board ship." It is suggested that a certain percentage, if not all, of these men be sent to this place. This would prevent feigning inaptitude for the service, as it is possible that many who become dissatisfied with service conditions wilfully commit offenses in order to be discharged, whereas the more scrupulous would refrain from using this means. The discharge of undesirables from one place would permit a uniform standard of desirability. It would also be mutually beneficial to the service and to the individual. These men would be very little added expense to the Government, and a small percentage restored would possibly justify this additional expenditure.

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[1] Lombroso, "Criminal Man."

These undesirables, granted they did prove unadaptable, would have the advantage of the salutary measures now enforced at this station and would probably leave the Navy more valuable members of society than if they were discharged without any attempt to correct their deficiencies or to verify the diagnosis. The remarkable results obtained in elevating the efficiency of defectives and deficients—for instance, the education of the deaf blind—could never be accomplished except by those patiently interested and peculiarly adapted for specialization in this character of work.

More adequate facilities for instructions should be instituted. The average detentioner after a few weeks' confinement outgrows his antagonism, realizes his deficiency, and is willing to assist his superiors in improving himself professionally.

A naval prison in contiguity to this place, by psychic effect, might act as a powerful factor in reformation. Respect for authority is but a "synthesis of love and fear."

POSSIBLE OBJECTION TO THIS SYSTEM.

A radical departure from any accepted system of administration is apt to be the subject of adverse criticism. This station will undoubtedly prove no exception. Why is it not possible to apply this system aboard ship? It would be less expensive, it is true. Specialization of industry is the keynote of modern advancement. The standards of comparison of the different commanding officers are so variable that a uniform rule for the diagnosis of the undesirable would be difficult.

Furthermore, an institution such as this is mutually beneficial; the offenders react on each other; it exercises the gregarious instinct of mankind, as a college does, to follow the successful. The desire to follow in the footsteps of an illustrious senior often stimulates an underclass man to an increased endeavor; in a similar manner the detentioner is led to emulate the example of his companion who becomes a probationer and to shun the unsuccessful one who is denied the privilege of probation and finally discharged. Aboard ship the relative number of delinquents is too small to exercise this instinct. Also, these culprits realize their position on shipboard and know their records hold them at a disadvantage with the rest of the crew. Here each man begins anew under the same circumstances as the rest of his companions.

There are possible objections to this system. The proportion of adaptable to unadaptable may be so small that the restoration of so few reformed offenders to the service would hardly justify the maintenance of this station. If this did happen, then punitive measures could be made more severe, thus altering the character of the insti-

tution from a reformatory to a prison, with no added expense to the Government.

In this paper there is one fallacy in the logic. The premise that this place will be able to change the "potentially adapted" to "adapted" is assumed, not proved. The past success of this system (restorative percentage of 62) and the result of recent penological experimentation warrant this tentative assumption.

Perhaps to some this article may seem to take a rather lenient view. It is not written from a humanitarian standpoint, but to show the mutual benefit of this system to the personnel and to the Government. Leniency might "jeopardize discipline." Aboard ship the maintenance of military discipline necessarily requires that rigorous treatment be regulated more by the nature of the offense than by the character of the offender. But this station, isolated as it is from the Navy, would be able under the direction of the specially adapted officials to scientifically apply the proper remedy, sedative or stimulative, to each individual case. To illustrate the varied relationship between the crime, the culprit, and the treatment, consider the offense "drunkenness." If the offender is a dipsomaniac, then medical treatment suffices; if he is an habitual drunkard, detention is advisable; if it is due to inexperience, admonition and mild punishment may be best; if it is caused by indifference to authority, vigorous punitive measures may accomplish the optimum results. This individualization of treatment and diversification of punishment with an "analysis of antecedents,"[1] permissible aboard ship to a limited extent only, appears to afford a fertile field for scientific investigation. To mention an analogous case, imagine a physician treating a disease without reference to the patient; in some cases of pneumonia stimulants are beneficial, in others detrimental.

It has been stated that the worst class of offenders, in order to take advantage of any leniency granted, often become model prisoners. This may be mentioned as a possible objection to probation. However, the percentage is probably small, and it is presumed that under the guidance of experienced and specially adapted officers this could be reduced to a minimum.

PROGNOSIS OF THE SUCCESS OF THIS INSTITUTION.

The disciplinary barracks is still in its infancy, and any statement regarding the future would at this time be purely conjectural, yet from a theoretical standpoint the success and permanency of this institution seem insured. The Government spends $300 to $600 (estimated) to recruit, equip, and instruct an enlisted man, and it does not seem proper to lose the service of this individual without

[1] MacDonald, A.: Bu. of Educ. Cir. of Information No. 4, 1893.

a thorough trial of his qualifications. Likewise a certain amount of responsibility to protect the individual is assumed by the Government in removing him from natural domestic conditions and placing him in nautical and unacquainted environments. The return of a small percentage (10 to 15 per cent) of these reformed persons to the service might justify the maintenance of this place both for moral and financial reasons.

Should this station not prove a success, even those who are not in accord with this change must admit it will probably be due to a lack of cooperation or fault of administration and not to an error in the principle of the probation-detention system.

AGE AND CHARACTERISTICS OF RECRUITS.

A vast majority of the personnel of the Navy at the time of their first enlistment are about 20 years of age and at that period of life when self-importance is uppermost but judgment, subordination, and discretion are poorly developed. It appears that at this age the capability of adaptation to external environments is less and that individuals are less amenable to corrective measures and discipline than when a few years younger or older.

At an early age discipline is secured by intimidation and through flexibility of character, at a later age than 20 years the more developed judgment would prevent the violation of regulations when punishment is known to be inevitable. Consequently, from a disciplinary viewpoint, the present age of enlistment is the most inadvisable in adult life, yet certain necessary conditions will always cause it to be the usual age of acceptance.

Classification of offenses.

Offenses.	Number.	Per cent of total.	Restoration percentage.	Disposition.					Classification.			Rates.			
				Restored.	Discharged.	Deserted.	Medical survey.	Returned to prison.	Adapted—Class A.	Adaptable—Class B.	Unadaptable—Class C.	Marines.	Seamen.	Engineers.	Other branches.
Absence	164	50.00	75.54	124	27	5	6	2	41	89	34	15	80	51	18
Fraudulent enlistment	81	24.69	58.02	47	23	1	4	6	5	45	31	17	21	35	8
Drunkenness	18	5.48	66.60	12	5	....	1	....	9	6	3	11	3	4	....
Neglect, disobedience, refusing	43	13.10	53.48	23	13	....	5	2	7	22	14	15	9	17	2
Assault, abusive and threatening language	8	2.43	12.50	1	4	2	....	1	....	2	6	3	3	2	....
Scandalous and prejudicial conduct	11	3.35	63.63	7	2	....	....	2	2	4	5	3	6	2	....
Miscellaneous	3	.91	33.33	1	2	....	....	....	....	3	....	1	2	....	....
Total	328	....	65.52	215	76	8	16	13	64	171	93	65	124	111	28

Recently, in order to present the heterogeneous personnel of this station in a more complete and concise form for investigation and study, I have endeavored to classify 530 of them according to the following scheme:

CLASSIFICATION OF PERSONNEL.

Class A.—Adapted.

Capable, efficient, and adapted for the service.
- (1) Inculpable, but unfortunate.
- (2) Culpable, but actuated by some temporary morbid psychological condition.

Class B.—Adaptable.

Potentially capable and probably eventually desirable for further retention in the service.
- (1) Ignorant and inexperienced.
- (2) Indifferent and irresponsible.
  - (*a*) Lethargic.
  - (*b*) Misapplication of excessive energy.
- (3) Lacking in self-control as to intoxicants, irritability of temper, insubordination, etc.

Class C.—Unadaptable.

Unadaptable for service conditions.
- (1) Mentally deficient.
- (2) Morally undesirable.
- (3) Physically unfit.
- (4) Military recidivist.

CHARACTER OF OFFENSES.

A study of the classification of offenses demonstrates the innocent nature of the majority. About 50 per cent are due to absences. The following may be considered as a classical type of this offense. A fireman of good report, whom I had previously known for two years, stated that he left the ship one day about Christmas time on liberty with no unusual intentions. He was having so much pleasure that he failed to return on time, and being already overtime he decided to continue his fun before going back to take his punishment. Time slipped by, as it always will to the young, and when he realized his condition four days had elapsed. He then "got cold feet" and procrastinated till 10 days had passed, then he saw a naval prison for his future. There was no intention of desertion; he still intended to return each day. On the seventeenth day his declaration of desertion was forwarded to him by his sister. His respect for his family and his pride aroused his courage, and he returned to take his punish-

ment. This is a common example caused by thoughtlessness and carelessness with no criminal or premeditated intentions. In so many thousand enlisted men it is conceivable that in a few isolated cases, when the circumstances are very enticing, this susceptibility to temptation may occasionally occur among the very best. This is not the general rule, but we are dealing principally with exceptions.

What might be termed the " restoration percentage " is the relative number restored or discharged with a recommendation for reenlistment. The following figures are compiled from the commanding officer's annual report for the last fiscal year:

	Number.	Restored.	Restoration percentage.
Detentioners	252	[1] 228	89
Probationers	148	[2] 105	70
Total transferred	183	[3] 113	62

[1] To probation.
[2] To duty.
[3] To duty (includes those discharges with a recommendation for reenlistment).

It is interesting to note that the restoration percentage of the various branches are about the same. More recent figures indicate that the artificer's branch will show a much higher index of restoration.

Restoration percentage of the different branches for fiscal year.

	Number received.	Restoration percentage.
Seaman branch	166	58
Engineers division	153	65
Marines	96	55
Other branches	36	50

FRAUDULENT ENLISTMENT.

It will be noted that this is well divided between the different classes. The causative factor of this crime is varied, including necessity, ignorance, restlessness, mental irresponsibility, etc. Two of the cases in class A having served about 15 of the best years of their life in the service attempted to reenter by fraud. One man in the ignorant and inexperienced class (B–1) was given a medical survey, after being in the service 12 days; partly through ignorance he reenlisted under the same name. Comparatively speaking, a large number (21 per cent) of the fraudulent enlistments were formerly discharged on a medical survey. The following are some of the disabling disorders: Syphilis, hernia, rheumatism, heart disease, kidney disease, flat feet, insanity, gonorrhea, etc.

Although the average man is cognizant of many hundred different names, yet in a large percentage of cases (83 per cent in a series of 24) he assumes a name for fraudulent enlistment that is similar in some degree to the original. Perhaps this fact may suggest some interesting psychological deduction.

The following illustrates a few of the similarities, but for obvious reasons the names are altered:

1. Jones, Thomas Joseph, alias Jones, Joseph Thomas.
2. Brown, Joseph, alias Brown, Jacob.
3. Henry, W. C., alias McHenry, W. C.
4. Jackson, Henry George, alias Smith, Henry George.
5. Muller, T. W., alias Mueler, T. W.

Character of discharge prior to fraudulent enlistment.

	Number.	Per cent.
Medical survey	24	21
Undesirable discharge	29	24
Bad-conduct discharge	40	34
Dishonorable discharge	24	21

Service last discharged from.

Navy	93
Marine Corps	11
Army	13

Twelve had served in the Army and Navy before disqualifying discharge, two had served in the Army, Navy, and Marine Corps and had been chief petty officers and first sergeants. One person is said to have " frauded " 8 times, another 13 times, which statements, however, are believed to be somewhat exaggerated.

LENIENCY IN PUNISHMENT.

Since writing the above remarks the pendulum of public opinion, according to the daily press as authority, in regard to leniency has started to swing in the other direction. Juvenile courts and probation methods are severely criticized as ineffective.

Too often lenience has been advocated for purely humanitarian and not corrective reasons. Well-meaning individuals with more sympathy than sagacity often dwell on the shining examples of class A (partially culpable), while on the other extreme, with more experience than patience, almost invariably omit class B (reformable) in their denunciatory discussion of class C (irreclaimable). The happy medium is, of course, desirable. The question naturally resolves into, How is this practicable medium to be discovered? The

scientific interpretation of all available data (biological, anthropological, penological, etc.), might demonstrate a safe channel to be steered between the hazardous extremes which are now strewn with wrecks of former failures.

SUMMARY AND CONCLUSIONS.

The correction of offenders and the prevention of offenses should be the ultimate aim of all punitive measures.

The heterogeneity of this personnel forbids the collective administration of routine punitive methods.

The attainment of the most satisfactory results by corrective measures necessitates the administration of the therapeutic agents under the direction of specially adapted officials, whose duties permit a scientific investigation of all etiological influences, patrimonial and atavistic as well as environmental.

In my judgment a certain percentage (3 to 10 per cent) of this personnel should be treated solely by the alienists (some one versed in psychiatric diagnosis would possibly materially enlarge this number); in other instances (5 to 10 per cent) medical and hygienic treatment as corrective measures will suffice; and in many cases (10 to 30 per cent) the assistance of either the physician or alienist will greatly aid the penologist in his effort to reform culprits. Also that after treatment with proper disciplinary remedies 30 to 50 per cent of these misdemeanants can be elevated above the normal Navy standard of efficiency.

Also that the difference between the maximum and minimum capabilities of those individuals is as pronounced as those in actual service conditions; and in fact there is hardly another place in existence where a few hundred men on the same social status will present such marked variations in the degree of human efficiency as the personnel of the United States Naval Disciplinary Barracks.

In conclusion I wish to state that the proper treatment of culprits is a subject that has occupied the minds of men for ages, and that the above remarks are but the expression of personal opinion, partly verified by observation and investigation, and by no means are they presented as authoritative or conclusive. Nor has it been the purpose of this paper to advocate probation in all cases. My endeavor has been to suggest the moral obligation and mutual benefit of the correction of even a small per cent of offenders; the value of scientific investigation of the fundamental causative factors; the importance of the individualization of remedial measures; and that this correction may be frequently accomplished by probation, but at other times an adequate diversification of punitive measures is essential.

SOME OF THE OPINIONS OF BARON LARREY.

By JOHN CHALMERS DA COSTA, assistant surgeon, Medical Reserve Corps, United States Navy.

There is no book more interesting to a surgeon than the Memoirs of Military Surgery, by Baron Larrey, the great surgeon of the armies of Napoleon. The author was the greatest military surgeon that ever lived. He served for a time in the navy, but most of his active life was passed in the army. While in the army he participated in 26 campaigns and 200 battles in France, Russia, Prussia, Saxony, Italy, Spain, Austria, Poland, Egypt, and Syria.

In this book we see at close range the greatest Captain of the modern world, and those marshals and generals who helped to win his battles and uphold his power. In it we meet Ney, Davout, Murat, Lannes, Berthier, Dessaix, Kleber, Bessiere, Victor, Grouchy, Bernadotte, Soult, Massena, Junot, and a host of others. We see and learn to know the soldiers of those wonderful armies, soldiers who marched as conquerors through most of the capitals of Europe. We see those soldiers in barracks and bivouac, in march and battle, in advance and in retreat, in maneuvers and in hospitals, in the exultation of victory and in the depression of defeat. These memoirs take us away from the illusions and lead us behind the scenes of history. They show us war—fierce, grim, desperate, and unrelenting—in all of the red reality of its horror. They show us Larrey himself, able, learned, honest, truthful, quick and certain in observation, rapid in conclusion, decisive in action, patriotic, loyal, indefatigable, resourceful, humane, untiring, lion-hearted; the man of whom Napoleon said, "He is the most virtuous man I ever knew." But in this article I do not intend to write of Larrey the man, but purpose setting forth some of the views of Larrey the surgeon, views that were far in advance of his time and that served to profoundly influence thought.

Early in the nineteenth century military surgeons as a class opposed primary amputation and favored intermediate or secondary amputation. Larrey set himself against this custom and warmly advocated primary amputation; that is, amputation performed as soon as reaction from shock is obtained. Primary amputation is performed on one not yet weakened by days of sickness and hence one better suited to bear the shock. Secondary amputation is performed on one more or less exhausted. In these days, of course, it is much safer to wait than it was then. Then practically all wounds suppurated, and the danger of delay was vastly enhanced by suppuration. By Larrey's rule some limbs were lost that might have been saved, but multitudes of lives were saved that would have been lost by delay. Larrey said that early amputation avoids the danger of long confinement in the

hospital, as an amputation wound soon heals, is not prone to gangrene, and is not apt to produce hospital fever. He also pointed out that even if an amputation case must remain for some time on the field of battle the dressings need not be changed for several days. Larrey always amputated for gunshot splintering of the knee joint and frequently for gunshot wounds of other large joints. In the days of the large bullet and before the advent of antiseptic surgery this rule was unquestionably sound. He devised the method of disarticulation of the shoulder joint, which bears his name to-day and is the best method we have at the present time. He was accustomed to perform it in 10 or 11 seconds. He amputated many times at the tarso-metatarsal joint, the operation which afterwards came to be named Lisfranc's—the name by which we still know it. He advocated disarticulation at the hip joint and performed it many times, tying the femoral artery first. He amputated by two lateral flaps. He was accustomed to do it in 15 seconds. His first hip-joint amputation was in 1793, and this is the first case on record in the annals of military surgery. His method of operation was afterwards followed by Sir Astley Cooper, Malgaigne, and others. The surgical world was long opposed to hip-joint amputation. As late as 1808 Earle voiced the common opinion of surgeons in saying that a hip-joint amputation is "horrid," "dreadful," and "unjustifiable." (A Manual of Operative Surgery, by Sir Frederick Treves.) It is needless to tell how Walter Brashear, of Kentucky, in 1806, performed a successful amputation at the hip joint, and how this formidable operation was subsequently established as an eminently proper surgical procedure.

Larrey was very successful in his amputations. He often performed circular amputations, but he also did flap operations, and was one of the earliest influences in establishing the flap operation as a proper method. When he cut flaps, he cut the skin from without inward and cut the muscles from within outward by transfixion, an admirable method which is often used to-day. He did not sew up the wound of the amputation, but covered it with lint wet with an antiseptic, viz, alcohol. He held the flaps together by means of a roller bandage. He thus got admirable drainage, which is one of the reasons why so many of his cases recovered. In his memoirs he states that his views as to the value of early amputation found practical confirmation in the experiences that surgeons had had in the War of the American Revolution. In this war the French surgeons would not amputate early, and the mortality among the French soldiers was very large; but the American surgeons did primary amputations, and the mortality among the Americans was very small. Yet the French hospitals were infinitely superior to the American. Even at this early date it was evident that American surgeons were not afraid to have independent views or to act upon them.

Larrey was a warm friend of excision in suitable cases, practiced it extensively and most successfully, and maintained that many amputations could be avoided by its performance. In Egypt he excised the head of the humerus in 10 cases. In one case he also took away the outer end of the clavicle and the acromion process of the scapula. He states that in some cases a new joint formed and in others ankylosis took place. In these views he was years ahead of contemporary opinion. The operation was first suggested by Bilgner, the surgeon of Frederick the Great. Parke, in England, had recommended excision for joint disease some 30 years before Larrey performed it for gunshot wounds. Moreau, of France, had warmly advocated excision for disease a few years before the outbreak of the French Revolution, but the operation was almost universally condemned, and as late as 1839 Velpeau hesitated "before actually sanctioning its utility." (International Encyclopedia of Surgery, edited by Prof. Ashhurst.) The teaching of Mr. Syme, of Edinburgh, and Sir William Ferguson, of London, popularized the operation and vindicated the views of Larrey.

Larrey was uncompromisingly opposed to meddlesome surgery. He was accustomed to change dressings only when change was really required. When a case was doing well and the dressings were not stained, he allowed them to remain in place. In the wounds inflicted at the Battle of Benevento he did not remove dressings until the third day, because he knew they had been applied by "skilled surgeons." In some of his cases the wounds were found healed when the dressings were removed. One man while in Poland had had disarticulation performed at the shoulder joint. The dressings were not taken off until he reached Paris, and when they were taken off the large wound was found soundly healed.

In treating gunshot wounds he did away with scrapings, scarifications, dilitations, setons, and applications of wax, of oils, and of foul greases. He washed recent wounds with diluted salt solution. He dressed them with lint or linen wet with alcohol. Once when ordinary dressings were not obtainable he used paper. He was accustomed to wash infected wounds with Labarraque's solution.

In gunshot wounds of the chest, with bleeding into the pleural cavity, Larrey was accustomed to excise a portion of a rib and incise the pleural sac. He did this first in the Egyptian campaign. He found that the making of such an opening was followed by the cessation of bleeding and that if pus subsequently formed a drainage opening was all ready to give it exit. Before this plan was adopted by the surgeons of the army, gunshot wounds of the chest were frightfully fatal. The operation saved many lives. Larrey did not know how the opening stopped the hemorrhage, but he knew that it did so.

We now understand the matter. The hemothorax which occurs compresses the lung and arrests the hemorrhage. In recent times Dr. Le Conte, of the Pennsylvania Hospital, has warmly and ably advocated the operation for certain cases and has studied out the manner in which it is of benefit. I have practiced it several times with success.

At the time of Larrey and for years afterwards incision for empyema was regarded as a dreadfully fatal procedure. The success which Larrey had was phenomenal probably because he really obtained satisfactory drainage, a large and slow-closing opening being made by taking away a piece of a rib. Years subsequent to this period Dupuytren denounced operation in empyema because of its deadly peril, and it is only in comparatively modern times we have again reached the point of view advocated by Larrey.

Modern military surgery really takes origin from Larrey.

When he first went into the field he found that the custom was for the ambulances to drag far along in the rear, and wounded men always lay upon the battle field from 24 to 36 hours. There was no genuine attempt to give first aid on the battle field. He invented what he called the flying ambulance and used it for the first time, and most successfully, in the army of Gen. Custine. These ambulances were not in the rear, but were with the advance. First aid was given on the battle field, and this custom in some form or other has ever since been followed by military surgeons.

In the treatment of burns he cast aside the accepted views of the profession, and instead of bloodletting and purgation he relied upon food and stimulants.

He was constantly teaching the surgeons under him and the hospital aids under them. Wherever the army stopped for a few weeks he organized his schools of military surgery, and by the time he had been for a few years at the head of affairs he had certainly the best trained set of assistants in the world.

In the treatment of lockjaw he introduced the custom of feeding the person through the nose by means of an elastic catheter. He became persuaded in the Egyptian campaign that the water of the roadside ponds caused what he called "putrid nervous fever," and later he described this fever, which must have been typhoid. He described the presence of the epidemic disease in Brunn that broke out among the French and Russians. He calls it a nervous and putrid hospital fever, or an adynamic and ataxic fever. The victims suffered from violent headache, fever, quick and irregular pulse, turbid urine, and usually diarrhea. There was tremor of the limbs, subsultus tendinum, delirium, pain in the belly, sweating, nosebleed, and discharges of black blood from the bowels. The tongue was dry and red at the edges,

and the gums and teeth were covered with sordes. The patient was heavy and drowsy and apt to become insensible. There was often a remarkable change in the features of the face in this condition, which was certainly the Hippocratic face, and was regarded as significant of a fatal termination. It would seem that in this description Larrey recognized most points about typhoid except the eruption, and it might be difficult or impossible to detect an eruption in those who had been through a long and hard campaign.

Larrey points out that you can place two granulating surfaces together, keeping the wound clean, and thus obtain union, and he frequently sought to do this, getting what was known as union by the third intention. He demonstrated the very great value of heat in suppurating areas. He insisted that granulating wounds require no special dressing. He did not use poultices upon them, but used some nonirritating ointment. He was a great believer in rest in the treatment of wounds, and he aided this with compression made by bandages, particularly by flannel bandages. In certain large wounds of the skull he trephined for drainage. He trephined for meningeal hemorrhage, for depressed fracture, for comminuted fracture, and for any injury causing compression of the brain, and he thoroughly understood the importance of drainage in preventing pressure in intracranial hemorrhage. He recognized discoloration over the mastoid process occurring in certain fractures of the base. This condition we now call Battle's sign. He mentioned that injuries of the cortex of the brain impair the intellect, that injuries of the base and the ventricle produce paralysis, and that such paralysis is on the side of the body opposite to the brain injury. He mentioned that in such cases of paralysis, even when of long standing, the patient may be benefited by the relief of pressure, and that this should be effected by trephining the side of the head opposite to the paralyzed side. In some cases of gunshot wounds of the head he used a soft catheter to explore the wound. Discovering that the bullet had crossed the brain he trephined on the side opposite the wound of entrance, found and removed the bullet.

In all punctured wounds, wherever situated, he incised and drained.

Even the few facts here recorded of Larrey seem to justify the statement in the introduction that he was the greatest military surgeon who ever lived.

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The sources of information for this article are: "Memoirs of Military Surgery," by Baron Larrey; Life of Larrey, by Paul Trelare; Baron Larrey, by J. Chalmers Da Costa (Johns Hopkins Bulletin, July, 1906).

GANGOSA.

By W. M. Kerr, passed assistant surgeon, United States Navy.

Gangosa, a Spanish word meaning "muffled" or "nasal" voice, is the name which has been employed in Guam for many years to designate a disease characterized by a destructive ulceration usually beginning on the soft palate, pillars of the fauces or uvula, and extending by continuity to the hard palate, nasal cavity, and even to the face, neck, arms, and thorax. The term, for the past few years, has included cases of extensive ulceration of the skin and underlying connective tissue, occurring independently of the nasopharyngeal lesions, and nodular lesions of bone which have the gross appearance of syphilitic gumma. The disease occurs in both sexes, irrespective of age. It was found more frequently in the outlying rural districts of the island. The etiology has long remained a mystery. The disease has been thought by some to be a manifestation of syphilis. By others it was thought to be a sequela of yaws. Some students of the disease believed it to be a clinical entity. The etiological problem has not yet been completely solved and the disease still offers opportunity for research. The cure of this disease withstood the efforts of medical men stationed in Guam from the earliest Spanish times to 1910, when an outline of treatment was instituted which promises to cause the disappearance of gangosa, or at least to ameliorate its ravages. It is the purpose of this article to review the story of gangosa, to bring together the separate fragments of information determined by the various naval medical officers who have studied the disease during their tours of duty in Guam, and to discuss the status of the probable etiology as completely as our present knowledge permits.

The pathology of gangosa has never been carefully investigated, as the disease is not fatal, and autopsy is only possible when death results from intercurrent disease, at which time only the after effects and not the active manifestations are apt to be found. The gross lesions are destructive ulcerations of the nasopharynx, ulcerations of the skin and underlying connective tissue, and gummalike lesions of the bone. These lesions may occur separately or all three may be found in the same patient. No visceral lesions are found.

With nasopharyngeal involvement the patient first complains of sore throat or a slightly painful nasal occlusion. All pain, however, may be absent. On examination the earliest manifestation observed is a small ulceration which may be seen on the nasal septum, on one of the turbinate bones, on the posterior wall of the pharynx, on a faucial pillar, or on the soft palate. The ulcer is superficial and covered with a thin, dirty yellowish or browish-gray pellicle of necrotic tissue. The tissues immediately surrounding the ulcer are hyperemic and

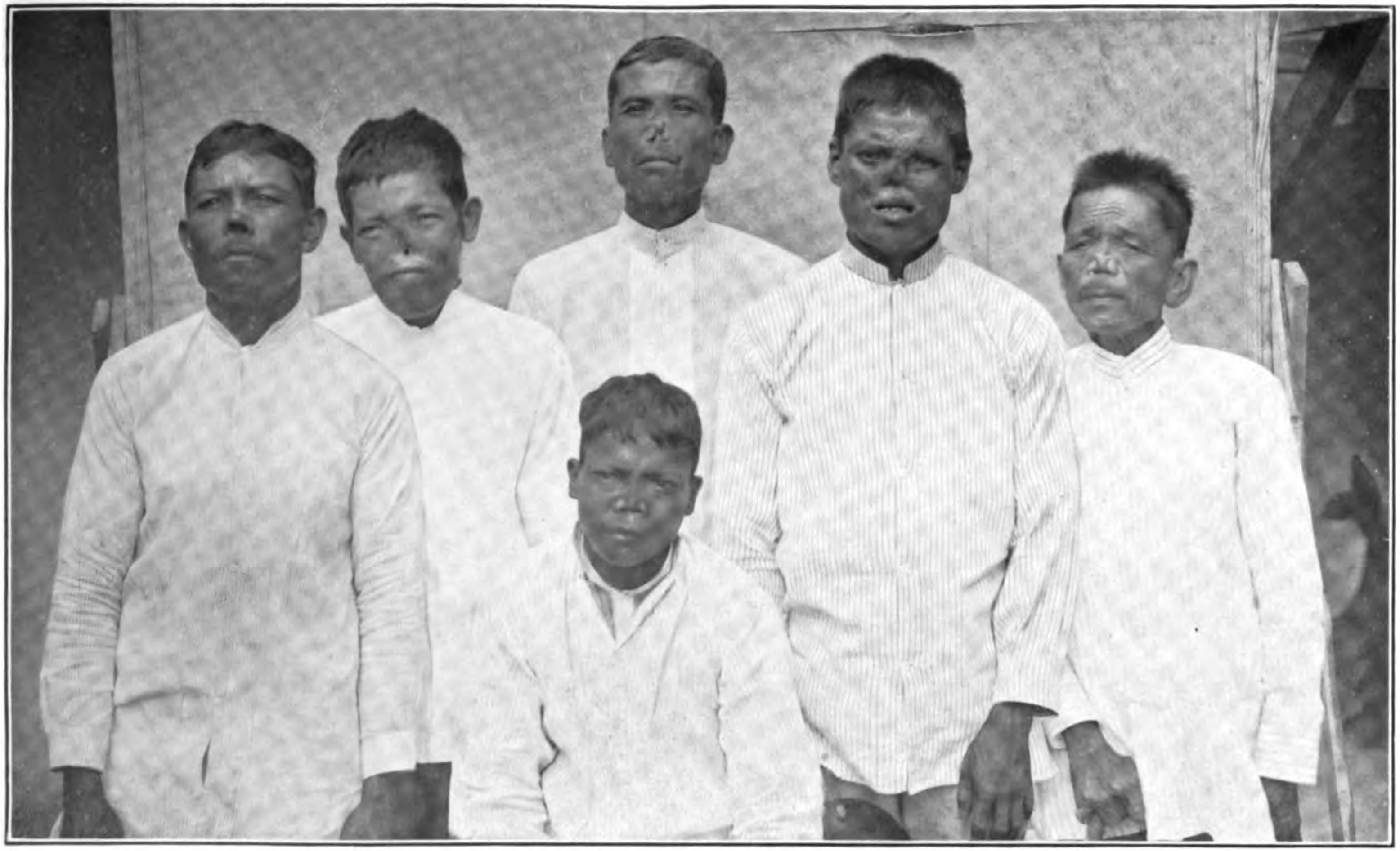

Fig. 1.—GANGOSA CASES WITH NASOPHARYNGEAL INVOLVEMENT.

Fig. 2.—GROUP OF GANGOSA CASES WITH NASOPHARYNGEAL INVOLVEMENT.

swollen. This causes the nasal obstruction when tissues covering the turbinates are involved. The pellicle breaks down and leaves an ulceration which steadily increases in size and advancing up the throat to the posterior nares, or posteriorly through the nose, attacks the soft palate, and after involving its entire thickness attacks the bony structure of the palate, the nasal septum, or the turbinates with often their ultimate destruction by a process of necrosis. The lesion is usually spontaneously arrested at this stage, the ulceration slowly healing with the formation of granulation and finally cicatricial tissue. The victim is sometimes left with the nasal cartilages and skin fallen in or entirely destroyed, and the nose and mouth one large cavity lined with scar tissue. Often the disease is arrested at an earlier period, and we have remaining to mark the affection merely a perforated nasal septum, or a perforation, or destruction of the soft palate, with little masses of cicatricial tissue in the pharynx. During the period of bony necrosis, ozena is marked and is one of the disagreeable features of the disease. The ulceration rarely, if ever, advances downward from its starting point in the pharynx. The larynx is rarely affected, and phonation remains perfect, though articualtion and the quality of the voice are sadly deranged. In a few cases the ulceration, after having destroyed the cartilage and skin of the nose, advances upon the skin of the face, and in exceptional cases extends to the neck, shoulders, arms, and thorax. The upper lip generally remains as a bridge of tissue across the large opening in the face, and over it one may look at the mouth and down the throat. The tongue and floor of the mouth are never affected.

Two types of ulceration of the skin occur. In one a small nodule or patch of nodules developes. These soften and generally discharge by a small opening at the apex, within which is a soft necrosing but not caseous mass, which when removed leaves a rather firm fibrous base. The surrounding skin is generally healthy or only slightly inflamed. In the other type of ulceration, which is more frequently observed, and which is apt to be very extensive, there is seen an advancing, raised, sharply defined, cyanotic margin, and a base composed of proliferated fibrous tissue upon which lies a mixture of necrotic and unhealthy granulation tissue, the whole bathed by a sero-purulent discharge. Often this type is observed at one or more portions of the circumference of a firm mass of scar tissue, the result of a previous ulceration. These two types occur on all parts of the body (except the abdomen), most commonly on the face and limbs, but frequently on the back and chest. If untreated they advance rapidly, are only slightly painful, heal spontaneously very slowly, are prone to recur, and lead to great disfiguration.

The gummalike lesions of bone are not common. They appear to arise in the periosteum as small firm nodules which become soft as they enlarge, finally presenting evidence of inflammation, and, if left to themselves, discharge a serosanguineous fluid through a small sinus. When opened a yellowish, gelatinous, necrotic mass is found below which is a circumscribed area of necrotic bone. These lesions most commonly involve the tibia, but any of the long bones, the sternum, or bones of the cranium may be affected.

The different types of lesions and the deformities caused thereby are clearly shown in the accompanying illustrations.

Probably the earliest attempt at investigation occurred in 1828, when a Spanish commission, which had been sent to investigate the conditions in the Ladrone Islands, as the Marianas group was then named, reported gangosa as being prevalent, and recommended that the cases be isolated on one of the smaller islands. This isolation was never effective, for when American naval forces arrived to take possession of the island, the medical officers found a large number of cases of this puzzling disease among the inhabitants. The extensive facial disfiguration caused by gangosa was striking, and B. A. Ward, surgeon, United States Navy, in the first report made on the sanitary condition of the island, considered the disease to be syphilis. This officer was attached to the U. S. S. *Bennington*, which remained in Guam but a short period, and it was natural, with the brief time at his disposal, to come to this conclusion as the disease on superficial examination looks not unlike tertiary syphilis.

The first report of gangosa, from a clinical standpoint, was made by J. F. Leys, surgeon, United States Navy, who under the name of Rhino-pharyngitis mutilans, described those cases which presented destructive lesions of the nose and throat. The disease was considered at that time to be contagious, and, as a prophylactic measure, upon the recommendation of the medical officers, the governor of Guam issued an order in April, 1906, which established a place of segregation for all cases having active lesions. The site selected was known as Ypao, and is situated on the shore of Tumon Bay, adjacent to the leper colony. Here were erected small houses, built according to the Chamorro style, a hospital, a storehouse, and a church. In this colony all active cases discovered among the inhabitants were forced to live and to undergo treatment which at that time was similar to that advised for chronic phagedenic ulcerations from other causes. In the nose and pharynx, applications of phenol and nitric acid, trichloracetic acid, saturated solution of silver nitrate, and strong solutions of formalin were used with a view to destroying the affected part or unknown causative agent, and often with apparent benefit. Cleanliness of the affected parts was maintained by spraying with antiseptic solutions. In spite of conscientious treatment,

Fig. 3.– GROUP OF HEALED GANGOSA CASES SHOWING THE RESULTS OF NASOPHARYNGEAL INVOLVEMENT, GUMMALIKE LESIONS OF BONE, AND EXTENSIVE ULCERATION OF SKIN AND UNDERLYING CONNECTIVE TISSUE.

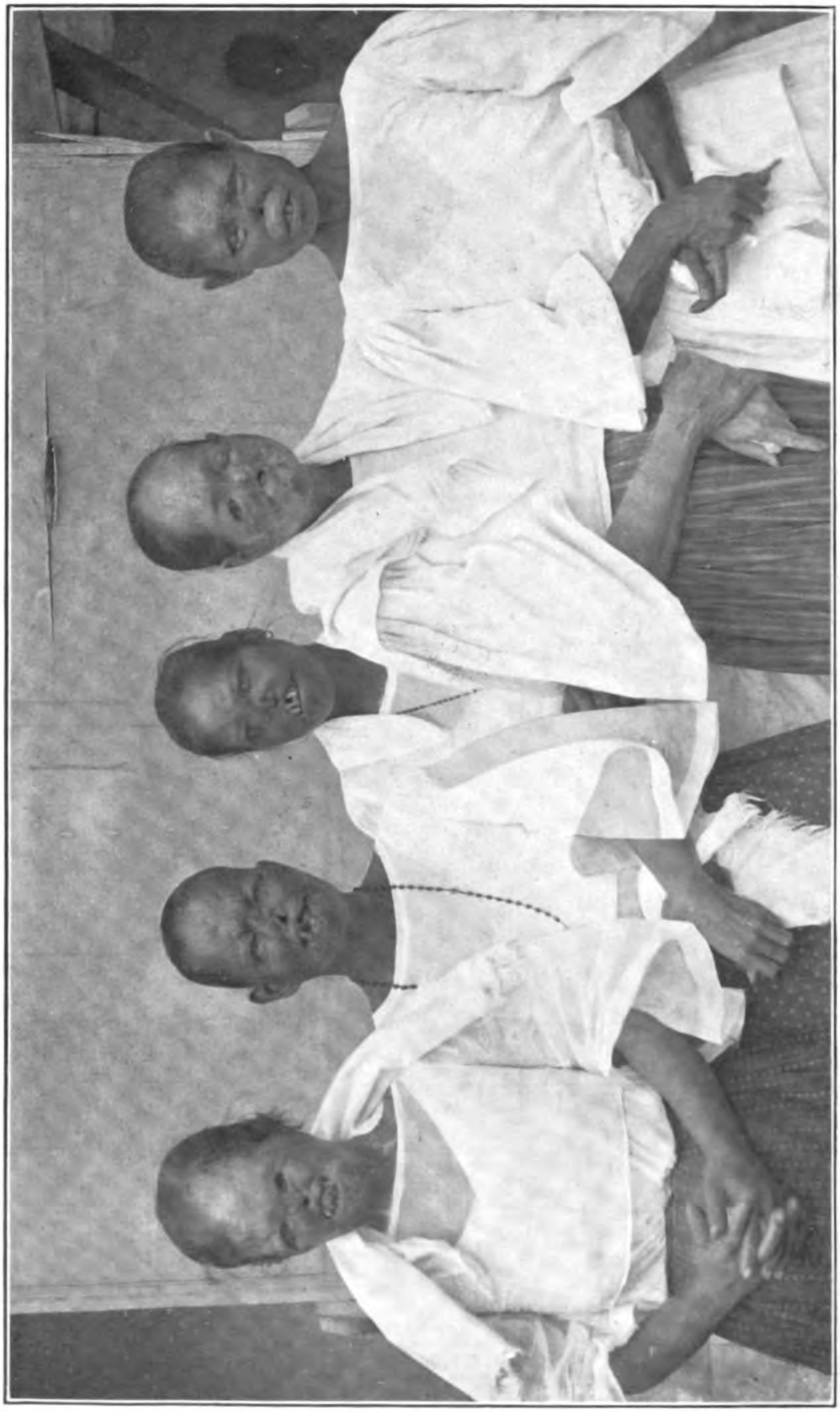

Fig. 4.—GROUP OF GANGOSA CASES SHOWING KERATITIS FROM DEFECTIVE CLOSURE OF EYELIDS FOLLOWING SCAR FORMATION.

no marked advance was made in diminishing the number of cases, and those cases which did improve showed a marked tendency to relapse. The application of caustics was painful and the lack of effect was discouraging to the patient, as well as to the medical officers and native dressers, whose daily duty it was to dress the repulsive ulcerations.

During the early months of 1910, partly on empirical grounds and partly because it was considered that the disease bore the earmarks of syphilis, H. E. Odell, surgeon, United States Navy, at that time senior medical officer of Guam, instituted the line of treatment which is in effect to-day, and which has eradicated the active manifestations of the disease. There was nothing new about the treatment. It had been tried before in these cases with no apparent benefit, but the secret of its success lay in its persistent application. Each inmate of Ypao colony was given a mixture composed of 15 grains of potassium iodide and one-fifteenth of a grain of bichloride of mercury dissolved in 1 dram of water. This dose was taken three times a day, and was soon increased to twice or thrice the above amount, according to age. The ulcerating areas were well washed daily with soap and warm water, and covered with a moist bichloride of mercury dressing. When the effect of this treatment became apparent, and case after case improved, it was deemed inexpedient to maintain the seclusion of gangosa cases at Ypao colony longer, and as soon as each case showed sufficient improvement, he was liberated and allowed to go to Agaña, where the naval hospital is situated, and to continue treatment at the hospital dispensary. At this time H. A. Garrison, passed assistant surgeon, United States Navy, had immediate supervision of the gangosa cases. In order to facilitate his work, as well as for purposes of statistics, he brought together all cases of gangosa on the island, secured their compulsory attendance at the dispensary in Agaña, and compiled a card-index system containing the data in each case, which has been of great value to his successors. At that time 338 cases existed among a population of about 11,000. When a patient's active lesions had completely healed, he was allowed to return to his home village and to continue treatment under the supervision of the village medical attendant, but was required to report at the hospital in Agaña each month for observation. The administration of the iodide mixture was to be persisted in for two years. In about eight months practically all active manifestations had subsided, but shortly a few relapses occurred. On investigation it was found that the visits to the village dispensary day after day, and three times each day, for medicine, which was not pleasant to the taste, had become irksome. Therefore these "children of the Tropics," reasoning not unlike some of our patients in more enlightened portions of the globe ("if I have no more sores,

why take this nauseous mixture longer? "), had slipped away to their coconut groves, where they hid until hunted out by the medical officer in charge of the gangosa treatment. These derelictions led to an order issued in November, 1910, by the governor of Guam, making the treatment compulsory, and imposing a fine of 25 cents for each dose missed. This penalty had the desired effect, and the treatment was continued until January 1, 1912, when it was discontinued for a period of six months in order to determine if after such a prolonged and persistent medication relapses would occur.

From time to time new cases of gangosa were discovered or reported voluntarily for treatment. These were recorded on the card index and placed on the iodide mixture. The first supply of salvarsan sent to Guam was used on some of these new cases with as surprisingly efficacious results as attend its use in the treatment of syphilis. Salvarsan in the future will be the prime factor in controlling the disease. If given in the early stages, the extensive destruction of tissue with its attendant disfigurement will be prevented. Salvarsan, however, should be supplemented by a prolonged course of mixed treatment.

Following the history of so many diseases, the therapeutics of gangosa was on a firm foundation while the etiological factor was yet unknown. A. J. Geiger, passed assistant surgeon, United States Navy, in January, 1908, reported the isolation of a bacillus in the lesions which was thought might have some connection with the disease. Later investigations showed that this bacillus existed in a great variety of conditions, both normal and pathological; that it was not pathogenic and had no relationship to the etiology of gangosa. Because of the gross appearance of the lesions and the rapid amelioration of the active manifestations when an antisyphilitic treatment was persistently adhered to, it was thought that the *Treponema pallidum* might be the cause. Long and careful search by several laboratory workers at various times has failed to reveal the presence of a treponema of any description, or an allied organism, in any of the lesions.

In January and February, 1911, after many of the cases had been under antisyphilitic treatment almost one year, 100 cases were selected and the serum reaction of each case determined by G. B. Crow, assistant surgeon, United States Navy, who employed Emery's modification of Wassermann's method. Eighty-two per cent were positive, 3 per cent slightly positive, and 15 per cent gave a negative reaction. Reactions were also determined on several blood relations (brothers and sisters) of those afflicted, but showing no evidence of the disease, with positive results. E. P. Halton, assistant surgeon, United States Navy, while investigating frambesia, which is common among the native inhabitants of Guam, in September, 1911, found

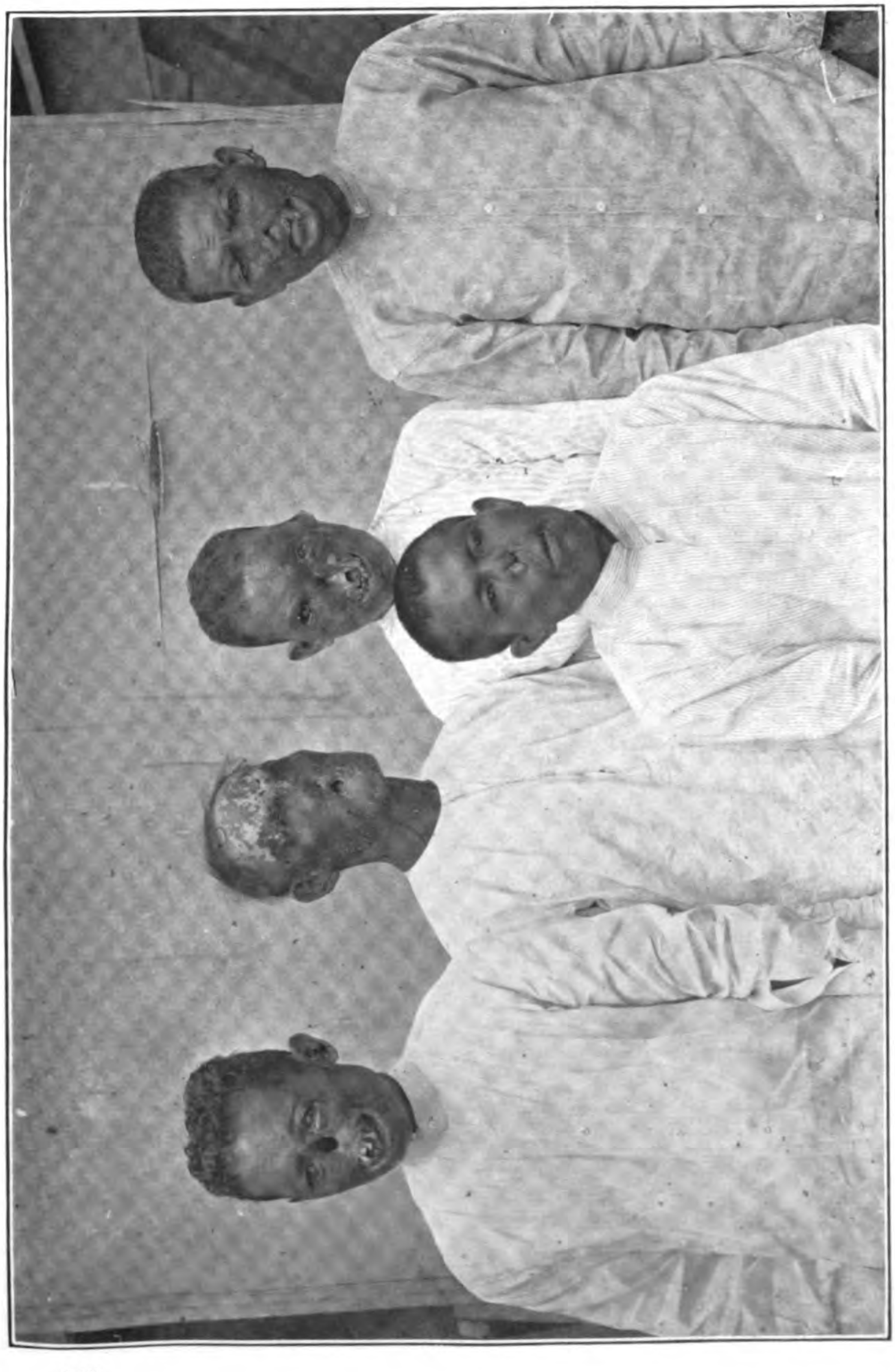

Fig. 5. GROUP OF GANGOSA CASES SHOWING MARKED DISFIGUREMENT FOLLOWING NASOPHARYNGEAL LESIONS.

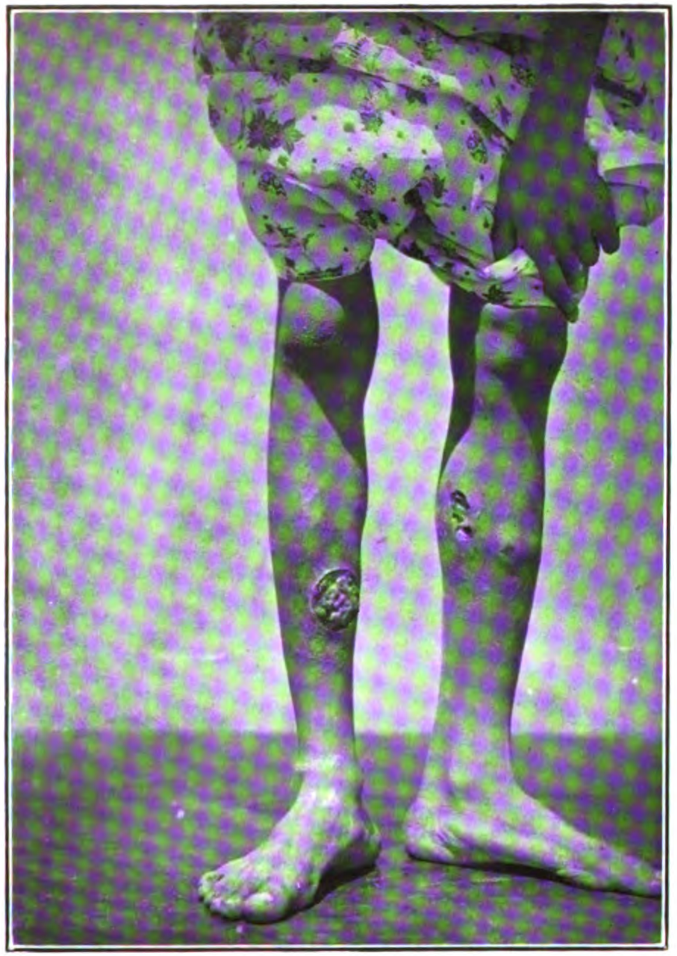

Fig. 6.

Fig. 7.

ULCERATION OF THE SKIN AND UNDERLYING CONNECTIVE TISSUES, WITH GUMMA LIKE LESIONS OF THE BONE. ONE NODULE HAS NOT BROKEN DOWN. (INDEX NUMBER 543.)

that this disease gave a positive serum reaction. He also determined that his control cases (apparently healthy natives) which gave a positive reaction had had frambesia and those which gave a negative reaction had never acquired that disease. Dr. Halton, using Noguchi's modification of Wassermann's technic, during October and November, 1911, determined the serum reactions of nearly all cases of gangosa tabulated in the card index. Corroborating the work of Dr. Crow, he found that a large majority gave a positive reaction. A few cases which Dr. Crow had found to possess positive reactions were found by Dr. Halton to be negative. This fact is credited to the persistent antisyphilitic treatment administered during the eight or nine months which had intervened between the two observations.

The next step in the investigation of the disease was the determination of the prevalence of frambesia in Guam. Two thousand four hundred and twenty-nine normal natives were examined, and, after excluding 534 children under 10 years of age who never had had frambesia, but who were liable to become infected in the future, it was found that 74 per cent of the remainder had contracted the disease, generally during childhood. This examination was then extended to the cases of gangosa, 315 in number, and it was determined that 83 per cent of the cases gave a history of, and in many cases showed the scars of, frambesia, which existed in practically every case prior to the first symptom of gangosa. The few exceptions were cases in which the secondary frambetic lesions had been immediately followed by the larger type of skin ulceration. The number of blood relations (brothers and sisters) in each family who had had frambesia later showed evidence of gangosa, while one or more children who had escaped attacks of frambesia remained free from gangosa. These facts may be more readily understood after examining the accompanying outline of 100 consecutive cases taken from the card index of patients in Guam.

Outline of 100 consecutive cases of gangosa occurring in Guam.

Case No.	Hospital card-index No.	Age.	Sex.	History of yaws. Yaws +; no yaws –.	History of yaws. Age at onset.	History of yaws. Children in family.	History of yaws. Children in family who contracted yaws (including patient).	Location of lesions.	History of gangosa. Age at onset.	History of gangosa. Duration of active lesions.	Relationship to other cases. Father of—	Relationship to other cases. Mother of—	Relationship to other cases. Child of—	Relationship to other cases. Brother of—	Relationship to other cases. Sister of—	Relationship to other cases. Cousin of—	Relationship to other cases. Uncle or aunt of—	Relationship to other cases. Niece or nephew of—	Serum reactions. Emery's modification (Crow).	Serum reactions. Noguchi's modification (Halton).
										Yrs.										
1	2	25	F.	+	4	8	8	Scars of ulcerations on left elbow, left foot, and on both knees	22	3					219	18		214	+	–
2	4	24	M.	+	2	1	1	Extensive ulcerations of left shoulder, left hand, and wrist	19	3½			131				55			
3	5	32	M.	+	7	2	1	Destructive lesions of nose and throat; scars of ulceration of right leg	20	½								26		+
4	6	50	F.	(?)	....	(?)	(?)	Destruction of nose and soft palate	14	2						293			+	
5	7	38	F.	+	10	2	1	Destruction of nose and soft palate; scars of extensive ulceration about face	30	6						274	60			+
6	8	22	F.	+	1	2	2	Loss of nasal septum and soft palate; scars of ulceration in pharynx	11	10					61	27	228		+	–
7	9	43	F.	+	9	1	1	Perforation of nasal septum; destruction of soft palate; scars of ulceration of neck	30	10		26, 393				5				+
8	11	38	F.	+	2	1	1	Ulceration of right foot	30	2						3			+	+
9	12	19	F.	+	8	4	2	Early case. Ulceration of nasal septum and soft palate.	15	½						292				+
10	13	45	F.	+	4	6	6	Destructive lesions of nose, lips, palate, and pharynx.	15	1						291	2			+
11	14	51	F.	+	39	(?)	1	Scars of large ulcerations on face, forearms, hands, left leg, and feet	39	11						232				–
12	16	64	F.	+	2	(?)	1	Ulceration of right leg and ankle	58	5										–
13	17	71	M.	+	10	2	2	Large ulceration on front and sides of leg	62	5				270			141			+
14	18	19	M.	+	5	1	1	Extensive ulceration of right ankle and heel	14	5						2		403		–
15	19	19	M.	+	3	7	1	Destruction of nasal septum	16	1								93		+
16	20	44	F.	+	7	6	2	Destructive lesions of nose and throat; ulceration of right knee	...						172	3			+	+
17	21	18	F	+	7	8	5	Destruction of nasal septum and soft palate; ulceration of pharynx	12	3			183		63, 142	18		425		+

18	22	11	F.	+	3	8	2	Ulceration of left knee and left toes	5	4			106		24	6		293		+
19	23	46	F.	+	2	(?)	1	Ulceration of left elbow and right wrist	44	3/8		521								−
20	24	13	M.	+	5	8	2	Perforation of nasal septum	9	2			106	22		6		293		+
21	25	30	M.	+	4	1	1	Destruction of nose and soft palate	17	2										−
22	27	30	M.	(?)	....	2	(?)	....do	11	2										−
23	28	32	M.	+	3	1	1	Destruction of nasal septum and soft palate	15	5										−
24	29	20	M.	+	(?)	4	1	Ulceration of left knee, left foot, and toes	15	2						198			+	+
25	30	31	F.	+	(?)	1	1	Destructive lesions of nose and throat	23	6						505				
26	31	35	F.	+	22	1	1	Lesion of right tibia, having the appearance of a typical gumma	33	1/2						427				−
27	32	12	M.	+	3	3	3	Early case. Ulceration of nasal septum	10	3/4			274		226 290	425				+
28	33	26	F.	− ?	....	3	0 ?	Perforation of nasal septum; destruction of soft palate and lips	12	2										−
29	34	21	F.	(?)	....	(?)	(?)	Lesion of left tibia having appearance of typical gumma; ulceration of right arm	19	2										+
30	35	55	F.	+	1	6	2	Ulceration of pharynx	35	10						436	171		+	+
31	37	25	F.	+	6	4	3	Ulceration of right forearm	23	1 1/2										
32	51	25	F.	+	3	2	2	Ulceration of both knees and ankles	23	1/2					75	116		338		
33	52	20	F.	+	8	4	3	Extensive ulceration of right elbow	10	6								124		+
34	54	18	M.	+	3	2	2	Destruction of nose; ulceration of right leg	14	4			108			29			+	−
35	55	19	M.	+	2	1	1	Destruction of nose; ulceration of forehead, upper lips, throat, left forearm, and left leg	7	12								4		+
36	57	20	M.	+	3	1	1	Lesion of right tibia, having the appearance of a typical gumma	19	2/3						68			+	−
37	60	19	M.	+	2	3	1	Extensive ulcerations of face, neck, both legs, and feet	12	4						51 77		7		+
38	61	24	F.	+	1	3	3	Destruction of nasal septum and soft palate	12	1/2						27			+	
39	62	34	F.	(?)	....	4	(?)	Ulceration of pharynx, left shoulder, and back	31	1										+
40	63	17	F.	+	2	8	5	Destruction of nasal septum and soft palate; hard palate perforated	10	5					21 142					+
41	65	46	F.	+	2	2	2	Destruction of nose; ulceration of pharynx	36	8					493	73		275	+	+
42	66	31	F.	+	3	2	1	Perforation of nasal septum; ulceration of face	14	5									+	−
43	67	42	F.	(?)	....	5	2	Destruction of nasal septum and soft palate; ulceration of face	34	4					444 522		199			+
44	68	20	M.	+	3	5	1	Large ulceration left foot	12	1/2								67		+
45	70	24	F.	+	2	1	1	Destruction of nasal septum; ulceration of pharynx	14	3/4										−
46	71	39	F.	+	2	2	2	Destruction of nose; perforation of soft palate; ulceration of pharynx, shoulder, leg, and arm	8	15										−
47	73	45	F.	(?)	....	(?)	(?)	Ulcerations about face	41	1						65			+	
48	74	32	F.	+	3	(?)	1	Destruction of nasal septum; large ulcerations of face, left leg, and foot	22	8		499				102				−
49	75	18	F.	+	3	2	2	Extensive ulceration right wrist	16	1/2					51	116		338		−
50	77	62	F.	+	7	(?)	1	Ulceration of right foot and toes and left index finger	45	1						192	65			+
51	79	32	F.	+	9	3	1	Destruction of nose; ulceration of forehead	15	5						175				−
52	90	62	F.	(?)	....	(?)	(?)	Destruction of soft palate	55	1									+	−
53	92	46	F.	(?)	....	2	(?)	Perforation of soft palate; ulceration of pharynx	38	1/2		147 404			391	187				+
54	93	64	F.	+	49	1	1	Ulcerations of left leg and foot, left elbow, hand, and fingers	58	3						491	19			−
55	94	42	F.	+	3	4	2	Loss of nasal septum and soft palate	30	10					458					+
56	96	44	F.	(?)	....	1	(?)	Ulceration of right heel and left leg	35	9										+
57	97	22	F.	+	6	6	6	Destruction of nasal septum and soft palate	18	1						54		184		−

Outline of 100 consecutive cases of gangosa occurring in Guam—Continued.

Case No.	Hospital card-index No.	Age.	Sex.	History of yaws: Yaws +; no yaws −.	History of yaws: Age at onset.	History of yaws: Children in family.	History of yaws: Children in family who contracted yaws (including patient).	History of gangosa: Location of lesions.	History of gangosa: Age at onset.	History of gangosa: Duration of active lesions.	Relationship to other cases: Father of—	Relationship to other cases: Mother of—	Relationship to other cases: Child of—	Relationship to other cases: Brother of—	Relationship to other cases: Sister of—	Relationship to other cases: Cousin of—	Relationship to other cases: Uncle or aunt of—	Relationship to other cases: Niece or nephew of—	Serum reactions: Emery's modification (Crow).	Serum reactions: Noguchi's modification (Halton).
										Yrs.										
58	98	11	F.	+	2	4	4	Ulceration of nasal septum; ulceration of right foot	7	2	....	....	....	....	133	306	....	....	....	....
59	100	41	F.	2	....	(?)	(?)	Destruction of nose and soft palate	22	10	....	....	....	....	....	22, 24	....	173	+	....
60	101	18	F.	+	2	1	1	Destruction of nose; ulceration of face, arms, and legs	11	5	....	....	....	....	....	....	....	....	+	+
61	102	39	F.	+	3	2	2	Destructive lesions of nose, pharynx, and lips	22	12	....	....	....	....	394	74	....	....	....	−
62	103	23	F.	+	3	(?)	1	Destruction of nose	12	9	....	....	....	....	....	102, 117	....	....	....	−
63	106	39	F.	+	8	8	2	Ulcerations of right foot and ankle; typical gumma of left tibia	31	6	....	22, 24	....	....	293	....	6	....	....	−
64	107	30	F.	+	24	8	1	Destruction of nasal septum and soft palate; ulceration of pharynx	24	1¼	....	335, 526	....	....	....	....	130	....	....	+
65	108	42	F.	+	9	6	1	Ulceration of face and pharynx; destruction of nose	18	2	....	59	....	....	....	97	211	....	....	−
66	116	22	F.	+	7	2	2	Ulceration of left leg	19	1½	....	....	....	....	276	51, 75	343, 349	....	....	+
67	117	46	M.	+	9	4	3	Destruction of nasal septum and soft palate; ulceration of pharynx	38	6	....	....	....	125	....	103	....	....	....	−
68	118	51	F.	+	(?)	(?)	1	Ulceration of both feet and ankles	42	10	....	....	....	....	....	....	....	....	+	+
69	119	42	F.	+	7	(?)	1	Destruction of nose; ulceration of face and pharynx	13	4	....	....	....	....	....	....	....	....	+	−
70	123	49	F.	+	7	1	1	Destruction of nose; ulceration of pharynx, face, shoulders, and left arm	42	5	....	....	....	....	....	....	....	....	+	+
71	124	39	F.	+	2	4	1	Destruction of nasal septum and soft palate; ulceration of right forearm	32	3	....	....	....	....	....	339	52	....	....	+
72	125	37	M.	+	1	4	3	Ulceration of forehead, right hand and foot, left foot and ankle	12	12	....	....	....	117	....	103	....	....	....	−
73	126	37	F.	+	24	8	1	Ulceration over perineum and buttocks	30	1	....	....	....	....	....	179	91	....	....	+
74	129	32	M.	+	8	(?)	1	Destruction of nasal septum and soft palate; ulceration of pharynx	14	2	....	....	....	....	....	....	....	....	....	−

75	130	47	M.	(?)	....	2	(?)	Small ulceration of nose	35	8						279	107			+
76	133	19	M.	+	8	4	4	Ulceration of neck	13	4				98		175				+
77	135	22	F.	+	2	1	1	Destructive lesions of nose and throat; ulcerations of shoulders, arms, chest, and thighs	5	15						174, 402		136, 311		−
78	136	52	F.	(?)	....	2	(?)	Destruction of nose; ulceration of pharynx	28	1										+
79	137	48	F.	(?)	....	1	(?)	Ulceration of left foot and leg	40	6									+	−
80	138	60	F.	+	10	3	3	Ulceration of face	54	1						516	490			−
81	139	32	F.	+	27	2	2	Ulceration of left upper extremity	28	3					478		238			+
82	140	49	F.	+	8	1	1	Destructive lesions of nose, pharynx, lips, and face	32	15									+	−
83	141	17	F.	+	3	(?)	1	Ulceration of pharynx, right foot, and leg	7	9						112		17		−
84	142	21	M.	+	1	8	5	Destruction of nasal septum and soft palate	14	4			182		21, 63	286, 459	185			+
85	143	27	M.	+	2	5	2	Ulceration of face and occlusion of anterior nares	10	1				344					+	−
86	144	60	M.	+	(?)	(?)	1	Destruction of nasal septum and soft palate	16	10	200, 179								+	+
87	145	26	M.	+	4	5	3	Destruction of nose and soft palate	22	2				337		421				+
88	146	64	M.	+	9	(?)	1	Destructive lesions of pharynx and palate	33	2	15					273				−
89	147	20	F.	+	2	6	2	Ulceration about right knee	13	½			92		404	187				+
90	150	56	F.	+	(?)	3	1	Destruction of soft palate	46	1						295			+	+
91	163	48	M.	(?)	....	5	(?)	Destructive lesions of nose and throat	21	1										+
92	168	17	F.	+	7	6	3	Ulceration about left ankle	15	¼			215				318		+	−
93	169	13	M.	+	3	6	5	Ulceration of left knee and wrist and right shin	7	4								346	+	+
94	170	20	M.	+	9	3	2	Destructive lesions of nose and throat	13	2				312						−
95	172	28	M.	+	12	6	2	Destruction of nose and soft palate; ulceration of pharynx and face	15	5				20		3				
96	173	14	M.	+	5	(?)	1	Destruction of nose and soft palate	8	3								123	+	+
97	174	32	M.	+	21	7	3	Destruction of nose	27	1				402, 501			310			+
98	175	39	M.	+	10	4	2	Ulceration of both legs	32	4						138			+	−
99	177	16	M.	+	7	2	2	Destruction of nasal septum; ulceration of pharynx	10	3			144	200				140	+	+
100	179	16	M.	+	5	2	1	Destruction of nose and soft palate	11	5						21, 43		301		+

The etiology of the chronic ulcerations occurring in natives of tropical lands has in the past caused much controversy. The observations and reports of men trained in laboratory methods re gradually increasing our knowledge of these conditions. The chronic ulcerations found in Guam and described under the name "gangosa" were at one time thought to be limited to the Marianas, the Caroline, and Marshall Islands, but cases with nasopharyngeal involvement, similar in appearance to those seen in Guam, have been reported from the Philippines, Fiji, Samoa, Queensland, and the adjacent islands, Papua, Torres Straits Islands, Thursday Island, the West Indies, South America, and Africa. Chronic ulcerations of the skin which resist treatment are frequent throughout the Tropics. The discovery of the Wassermann reaction and its application to these cases has brought to light the fact that a majority of the cases investigated give positive reactions. Likewise the introduction of salvarsan has demonstrated that a large majority of these ulcerations are healed by this preparation. The Wassermann reaction was at first regarded as specific for syphilis. Later investigations revealed the fact that several disease conditions, among which is frambesia, give positive reactions. Salvarsan, at first used so beneficially in the treatment of syphilis, was later found to act as satisfactorily in the treatment of frambesia. Therefore, as far as our present knowledge permits, it is fair to assume that tropical ulcerations of unknown etiology, giving a positive serum reaction and responding to salvarsan have as an etiological factor either *Treponema pallidum* or *Treponema pertenue*.

Gangosa in Guam during the past few years has been considered to be either a manifestation of syphilis or a sequela of frambesia, which disease investigation has shown to have been common on the island in the "presanitary days." Syphilis is a world-wide infection, and no race is immune to its ravages. It is reasonable to suppose that cases of syphilis occurred among the native population of Guam in the days when whaling vessels made frequent visits to the island. At the present time, however, syphilis, as it is recognized in other parts of the globe, does not exist either congenitally or in the primary, secondary, or tertiary form among the natives, and if gangosa be a strange form of syphilis, further laboratory study will be required to prove it. Likewise the fact that the majority of cases of gangosa are definitely preceded by infection with frambesia, give positive serum reactions, as does frambesia, and respond to a treatment which is remarkably efficacious in frambesia, is not proof that frambesia is the etiological factor, but they are strong points of evidence in favor of a frambetic origin.

During the past two years several important additions to our knowledge of the treponemata have occurred. Transmissions of *Treponema pallidum* from man to monkey and from monkey to rabbit

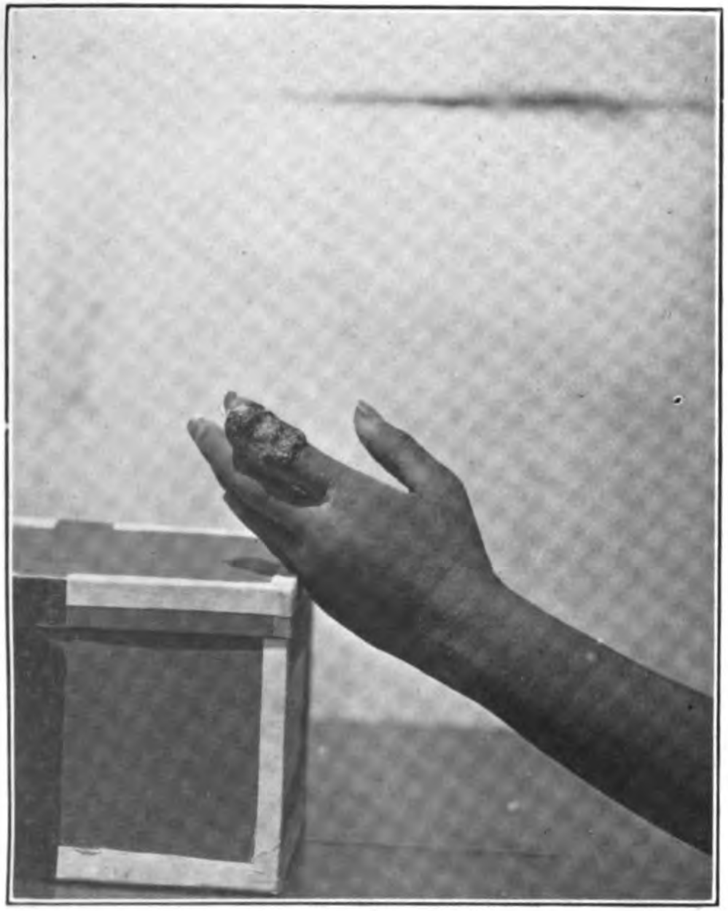

Fig. 8.— RAPIDLY SPREADING TYPE OF ULCERATION OF SKIN. (INDEX NUMBER 544.)

Fig. 9.— CICATRICIAL CONTRACTURE FOLLOWING EXTENSIVE ULCERATION OF SKIN AND UNDERLYING TISSUE.

Fig. 10.—EXTENSIVE ULCERATIONS OF LEGS AND ARM. (INDEX NUMBER 393.)

have been carried on by Hoffman and Nichols. The testicles of rabbits were found by Parodi and Ullenmuth and Mulzer to be especially suitable for purifying treponemata from associated organisms, as the latter disappear completely after passing one generation through the rabbit's testicle. Nichols experimenting with *Treponema pertenue* was successful in innoculating a monkey, and from that animal he was able to transfer the infection through three generations of rabbits. He studied the lesions produced in the testicle by both *Treponema pallidum* and *Treponema pertenue* and noted that points of difference existed. The nodules in syphilis were found to be the larger and their centers necrotic, whereas in the frambetic lesions the tissue was homogeneous throughout and the accompanying interstitial orchitis less marked. This advance was followed by the growth by Noguchi of treponemata in pure culture and lastly by the elaboration of Noguchi's "luetin" test, which, as far as our present knowledge extends, is specific for syphilis. In September, 1912, a supply of luetin was obtained from Noguchi for use in the cases of gangosa in Guam. The results of this test, as applied to gangosa, have not been reported, but the test will add another link to the chain of evidence. The actual proof of the etiological factor in gangosa appears to rest in the actual demonstration of the treponema, either pallidum or pertenue, which may be best brought about by following the methods of Hoffman and Nichols and Noguchi.

AMPLIFIED DESCRIPTION OF PLATES.

Figures 6 and 7. Index number 543. Female, age 13. Does not know if she has had framboesia or not. In November, 1911, she struck her shins against a step, bruising the skin. Three months later (February, 1912) the bone under the bruised area and the surrounding soft parts began to swell and became slightly painful. About March 1, 1912, a small ulceration appeared on the inner aspect of the right leg. On March 4 she came to the hospital for treatment. She presented this small ulceration, which had sharply defined borders. Its base rested upon muscle and was covered with a grayish, gelatinous, necrotic substance. The left tibia presented a painless nodule and some periostial thickening. She was kept without treatment, for purposes of observation, for four days, during which time the ulceration of the right leg increased in extent rapidly; another ulceration appeared on the inner aspect of the left leg, and the gumma-like nodule increased in size and showed signs of softening. The photograph was taken and 0.4 gram Salvarsan was administered intravenously on March 5, 1912. She was ordered mixed treatment, and the ulcerations were dressed with moist bichloride of mercury dressings. Immediate improvement began, and one month later healthy scar tissue had replaced the ulcerations and the gumma-like nodule had disappeared.

Figure 8. Index number 544. Female, age 19. Daughter of 516. Eight children in family, all having had framboesia. This patient was infected when 2 years of age, the mother yaw being on the left ankle. She has been healthy and active up to March 1, 1912, when, following a slight traumatism, a small ulceration appeared on the left index finger. This ulceration was painless, and

increased in size rapidly. She came to the hospital for treatment on March 18, when the photograph was taken. There was no temperature, and no leucocytosis. The ulceration extended over two-thirds of the circumference of the finger and involved the skin and underlying connective tissue only. The lesion was observed for two days, when it was seen to be extending. On March 29, 1912, 0.6 gram Salvarsan was administered intravenously, and the patient was placed on the mixed treatment. Rapid improvement immediately followed. When seen on April 4, 1912, the lesion had disappeared, its place being taken by healthy scar tissue.

Figure 10. Index number 393. Age 17. Frambœsia when 5 years of age (1900). Extensive ulceration of legs and arm began in 1905 and remained active until 1911, when the lesions healed under mixed treatment. Complement fixation test (Emery) positive in 1910. Complement fixation test (Noguchi) slightly positive 1911.

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SOME LABORATORY NOTES UPON THE BACILLUS OF DYSENTERY.[1]

By C. S. Butler, surgeon, United States Navy.

This society is due an apology from me because of the fact that this paper deals with several disconnected subjects. The truth is that it represents simply some notes made in the laboratory while doing some work upon *Bacillus dysenteriæ*. It has to do, first, with some indol determinations done with the dysentery bacillus; second, with a method of taking and preserving human and animal agglutinating sera; and, third, with an organism isolated from artesian-well water which has many of the characteristics of *B. coli* and yet is distinct from it.

INDOL DETERMINATIONS WITH THE DYSENTERY BACILLUS.

Regarding the first of these subjects, it is perhaps advisable to say a few words in explanation. Many of us doubtless have little faith

[1] Read before the meeting of the Manila Medical Society, Manila, P. I., October 7, 1912.

in the value of indol and nitroso-indol determinations in bacteriology. From a rather superfiicial study of the subject it would seem to me that nitroso-indol and indol determinations are beset with so many fallacies as to make them of relatively small importance. In the days when we depended upon culture characters almost entirely for bacterial identifications every single characteristic was turned to account, but in modern bacteriology, where agglutinating and bacteriolytic sera give us a short cut and a quick answer to our questions, it is a fact that indol determinations are falling more and more into disuse. There are conditions, however, in which it is of importance to know whether a given organism produces indol or not. I refer to the identification of *Bacillus coli communis* in the bacteriological examinations of water.

Indol (C_8H_7N) was first prepared by A. Baeyer in the year 1868. It may be made synthetically in a number of ways, but the points which interest us are that it is produced in the pancreatic digestion of albumin and also by many bacteria in breaking up proteid in solution. The substance "crystallizes in shining leaflets, which melt at 52° C. and boil at 245° C. (with decomposition) and is volatile in a current of steam. It is a feeble base" [1]. It was first recognized at a product of bacterial growth for *Spirillum choleræ* by Poel and later by Bujwid and Dunham, and was thought to be characteristic of the growth of this organism. There are several methods given for making up the media and for bringing out the reaction after bacterial growth. Kruse and Gorini have called attention to the undesirability of having any sugar (particularly dextrose, saccharose, or lactose) in the medium to be tested for the growth of the organism. Theobald Smith [2], in an effort to improve the method for determining the production of indol, was led to the belief that the best medium for bringing out the reaction was dextrose-free bouillon. He explained this upon the grounds of greater nutritive value of the bouillon over the ordinarily used peptone solutions or to the presence of substances in the bouillon-yielding indol more readily than did the peptone. It is certainly true that peptone solution, however prepared, offers to many strains of bacteria very poor conditions for vigorous growth. This is particularly true of dysentery bacilli. Recently, in trying the indol test with peptone solutions of differing reactions, it was found that not 1 of 16 stains of *B. dysenteriæ* grow during four days at 37° C. in peptone solution rendered alkaline to the extent of 0.5 c. c. of $\frac{N}{1}$ NaOH per 100 c. c. of medium (i. e., peptone whose reaction was minus 0.5 to phenolphthalein). Eight other bacteria grew with varying degrees of vigor upon this same solution and gave indol or not, according to their respective tendencies. We can not expect bacteria to produce indol in a medium upon which they will not grow, and it is

certainly reasonable to conclude that indol-producing bacteria will produce greater quantities of indol the more luxuriantly they grow upon the medium into which they are inoculated.

It is but one step further to reason, and I believe it is a fact from the work of others and from some observations of my own, that most bacteria which split any given carbohydrate, and also have the power of producing indol, will, if inoculated into a mixed proteid and carbohydrate medium, use only a minimum quantity of the proteid sufficient for their requirements so long as the carbohydrate is still present. But when the carbohydrate is all fermented out, if there is still vitality left in the organism, it will attack proteid more vigorously and give rise to indol. This would explain the observations of Kruse and Gorini that indol is not produced if sugar is present in the medium. It would explain, too, what happens when the medium which Theobald Smith recommends is treated as he advises. Smith's [2] method of making the medium is to extract beef either in the cold or at 60° C., inoculate it in the evening with a rich fluid culture of some acid-producing bacterium (he used *B. coli*), and place in the thermostat early next morning. The infusion, covered with a layer of froth, is boiled and filtered, peptone and salt are added, and the neutralization and sterilization carried out as usual. He depends upon the production of acid caused by fermenting the sugar to inhibit the production of indol and says that in the open arm of a fermentation tube where oxidation can go on indol will ultimately appear, while in the acid closed arm it will not. This is undoubtedly true, but why is not the alkali production in the open arm the result of the proteid decomposition and perhaps the same process as gives rise to indol rather than that the indol is a result of alkali production?

It is difficult to work out how any organism can produce alkali from a carbohydrate. Now, if *B. coli* can produce indol from proteid when all carbohydrate is gone, it would seem, since we do not know how much sugar is in Smith's medium, and since we can not judge when this is all used up, that this medium runs the risk of having some indol present in it when it is ultimately tubed and sterilized for final inoculation. Smith says that this never occurs, but it is certainly a possibility. We have recently tried a slight variation of Smith's medium to ascertain whether indol, if produced in the primary freeing of the muscle extract from sugar, would perpetuate itself in the final product after filtration and sterilization. Two portions of broth were made by extracting dog's muscle, the peptone and salt were added, and the media neutralized and sterilized. This differed in that dog's muscle instead of beef was used, and that the further procedures were carried out at once instead of in two steps. One portion of 1,000 c. c. was inoculated with a fluid culture of *B. coli* and

another similar portion was inoculated with *Spirillum choleræ*. About 16 hours after inoculation both of these cultures showed abundant growth. They were autoclaved at 20 pounds for 20 minutes and then each separately was mixed with prepared chalk and filtered through two thicknesses of filter paper. A beautiful light amber filtrate was the result. The reaction of the colon bouillon after filtration was + 0.6, that of the cholera bouillon was + 0.5. The reaction of the fluid at the time of inoculation was + 0.2. Three 10 c. c. samples of each were taken, and into one of each set 6 drops of c. p. H_2SO_4 were added, into another pair of each set 1 c. c. of a 1-10,000 solution of c. p. $NaNO_2$ was added, and into a third pair both the sulphuric acid and the nitrite were added. The third pair of tubes turned a cherry red. There was no color in any of the other tubes.

This, of course, does not disprove what Smith claims will happen, for his method was not carried out as he directs; but it does show, it seems to me, that if indol were formed in the preliminary fermentation it would persist in the final product, and it shows that although indol is a feeble base, it may nevertheless be formed in the presence of an increasing acid reaction. We have repeatedly made up the media just as Smith describes and inoculated separate portions of the infusion with *B. coli* and *Sp. cholerae*. Some of these infusions were made from beef and some from dog's muscle. We have never in any case seen indol produced by either organism in this primary fermentation within the time specified, i. e., from one evening until early next morning. And some of the earliest-appearing and most intense indol reactions were obtained with these media prepared just as described in the article by Theobald Smith. This method of preparing the media for indol determinations reduces to a minimum the need for guessing at the result. That the guess on the result often figures will be evident from the following tables which appear on different pages of my notebook and are put down just as they were entered at the time of making the observations. When the readings were made, though dealing with the same set of bacteria, no reference was made to the performance of any given organism upon previous occasions. For comparison two determinations are combined on the same chart. Column No. 1 indicates the presence or absence of nitrites, column No. 2 of indol, and column No. 3 indicates the same set of tubes as column No. 2, after introducing H_2SO_4 and $NaNO_2$, and leaving at 37° C. for 24 hours. Six drops of c. p. sulphuric acid were introduced into each tube after 48 hours' growth. After a wait of 15 minutes to determine the presence of nitrites, 1 c. c. of a 1-10,000 c. p. $NaNO_2$ solution was run in from a burette. A reading was made after one-half hour and again after 24 hours in the incubator.

The following is the list of bacteria upon which the several determinations were made:

C-21. Spirillum cholerae.
C-31. Bacillus alcaligenes.
D-34. Bacillus dysenteriae (Hiss-Russell strain).
D-32. Bacillus dysenteriae (Flexner strain).
D-46. Bacillus enteritidis (Gaertner).
C-25. Bacillus coli.
D-42. Bacillus dysenteriae (Shiga strain).
C-27. Bacillus paratyphosus B.
D-20. Bacillus dysenteriae (Strong strain).
D-36. Bacillus dysenteriae (Shiga strain).
D-48. Bacillus dysenteriae (Shiga strain).
D-50. Bacillus dysenteriae (Shiga strain).
D-30. Bacillus dysenteriae (Shiga strain).
D-22. Bacillus dysenteriae (Shiga strain).
D-38. Bacillus dysenteriae (Shiga strain).
D-40. Undetermined. Isolated from feces of dysentery case. An organism of the enteritidis group.
D-24. Undetermined. Supposed to be a dysentery bacillus, but it coagulates milk and acid-ferments lactose; an old laboratory culture.
D-28. Bacillus dysenteriae (Flexner type).
C-23. Bacillus typhosus.
D-44. Bacillus dysenteriae (Flexner type).
C-29. Bacillus typhosus.

The first two determinations, the A and the B series, were made upon the 23d and the 29th of July, respectively. The media used were the same on the two occasions. With the B series a blank control was run which was not the case with the A series. The following table shows the results as read:

	A series, July 23.			B series, July 29.		
	1	2	3	1	2	3
C-21	+	++	++	++	++	++
C-31	0	+	+	0	0	++
D-34	0	+	+	0	+	++
D-32	0	+	+	0	+	+
D-46	0	+	+	0	0	+
C-25	0	++	++	0	++	++
D-42	0	0	+	0	0	0
C-27	0	+	+	0	0	+
D-20	0	+	+	0	+	+
D-36	0	+	+	0	+	+
D-48	0	0	+	0	0	+
D-50	0	0	+	0	0	+
D-30	0	0	+	0	0	0
D-22	0	0	+	0	0	+
D-38	0	0	+	0	0	0
D-40	0	+	+	0	+	(1)
D-24	0	++	++	0	++	++
D-28	++	++	++	++	++	++
C-23	0	0	+	0	0	+
D-44	0	0	+	0	0	+
C-29	0	0	+	0	0	+
Control	None.	None.	None.	0	0	(2)

[1] Tube broken. [2] Color slight.

In these two sets of reactions C–21 and D–28 produced not only indol, but also a nitroso body which gave a pink color with H_2SO_4 alone. It also appears that after standing in the incubator for 24 hours (which intensifies the reaction, and yet, owing to the H_2SO_4, sterilizes the cultures), practically all the tubes showed a pink color. With the B series there are three tubes, viz, D–42, D–30, and D–38, which showed no pink color after 24 hours from the time of introducing the H_2SO_4 and $NaNO_2$. This is probably accounted for by the fact that with the B set controls uninoculated but otherwise treated as the inoculated tubes were used with which to compare each tube of the series, and indol was only placed as "plus" when the inoculated tube showed more color than the control. It demonstrates that even when indol reactions are read by the same individual in cultures subjected to the same conditions the individual error is to be considered. It was an attempt to read the reaction too close to the dead line. The personal error must be far greater than is the error of the individual. This attempt to read the reactions too closely also accounts for the fact that Shiga strains of dysentery bacilli are placed as positive for indol. The slight charring effect of sulphuric acid upon the media resulting in a darkening of the bouillon, combined with a desire to get too close a reading, both aided and abetted by a slight trace of imagination on the part of the reader, may forever stigmatize the most "innocent of bacteria" as an indol producer. The man who is looking for slight color in an indol reaction will generally find it. He is the very reverse of the color-blind man. He sees color in everything. Therefore we should not try to make the reaction too delicate. It is a gross test and should not be elevated to the importance of a delicate one. It is a slow test and should not be hurried, and while important from the standpoint of the classifier, is of small importance to the bacteriologist, who gets his material for diagnosis to-day and has to disgorge the diagnosis to-morrow morning "not later than 9.30 by telephone."

The following chart shows the results of indol reactions done upon the same series of bacteria as A and B and recorded in the same way. The only difference was that in making up the peptone solution, c. p. sodium chloride was used in the C and D series, while ordinary table salt was used for the A and B series. The C series was grown for 18 hours, the D series for 48 hours.

	C series, 18 hours' growth.			D series, 48 hours' growth.		
	1.	2.	3.	1.	2.	3.
C-21	0	++	++	0	++	++
C-31	0	0	0	0	0	+ Very slight.
D-34	0	0	+	0	++	++
D-32	0	+	+	0	+	+
D-46	0	+	+	No tube.		
C-25	0	+	+	0	++	++
D-42	0	0	0	0	+ Slight.	+ Slight.
C-27	0	Tube broken.		0	+	0
D-20	0	+	+	0	+	+
D-36	0	0	+	0	0	0
D-45	0	0	0	0	0	0
D-50	0	0	0	0	0	0
D-30	0	0	+	0	0	+ Very slight.
D-22	0	+ Slight.	+ Slight.	0	+	+
D-38	0	Contaminated.		Culture contaminated		
D-40	0	No tube.		0	+	+
D-24	0	+	+	0	++	++
D-28	0	++	++	0	++	++
C-23	0	+	+	Contaminated.		
D-44	0	+	0	0	+	+
C-29	0	0	+	0	0	0
Control	0	0	0	0	0	0

These two sets of reactions (C and D) when compared with each other agree in the main, but there are some exceptions. In the third column of the C series, D–36 is marked as giving indol in 18 hours, while the same organism in the D series and growing in the same solution did not give indol in 48 hours. In the D series, C–27 is marked as + for indol at the time of introducing the H_2SO_4 and $NaNO_2$ and as minus indol 24 hours later. The color always remains the same or increases on standing. So this is another instance of individual error.

When the two series C and D are compared with the A and B series there are numerous discrepancies observed. Two of these are that C–21 and D–28 which, in the A and B series gave nitrite, in the C and D series failed to show any pink body upon introducing H_2SO_4 alone. They gave the cholera red reaction at one time and failed to give it at another, when the only known difference in the conditions was in the sodium chloride with which the media were made. The conclusion would seem justified that the impure sodium chloride contained some nitrite or something convertible into nitrite, which upon the addition of H_2SO_4 gave the pink body before any further nitrite was added. It may have contained some nitrate which was converted by these two cultures into nitrite, but it could not have contained any nitrite as such, for if it had then all the tubes in this series which subsequently gave the indol reaction should have also turned pink upon introducing sulphuric acid alone. The explanation which appeals to me is that the production of nitrite is variable with those bacteria which are supposed to produce it, and that we have not yet identified the conditions under which this variability is likely to occur.

This reading was not due to any individual or personal error, as the red color was so pronounced upon introducing H_2SO_4 that another doctor, two laboratory assistants, and a trained nurse at once picked these two cultures as being pink when asked independently and each without the knowledge of the other to pick out any tubes showing pink. The cholera spirillum is expected to give the cholera-red reaction, but not so with the dysentery bacillus. D–28 certainly gave the cholera-red reaction, and it is perhaps not an exaggeration to state that if this particular strain had fallen into the hands of some of our classifiers there would have been another type of bacillus dysenteriæ to add to the "57 varieties" we already possess. Indol reactions with these same cultures have been tried several times since those recorded in the charts A, B, C, and D. C–21 has never given the nitroso-indol reaction at any time since, though always giving a large amount of indol. D–28 has failed to give it twice and has given it two other times, once after 10 days' growth and another time after 28 days' growth. On both these occasions, however, the determinations were made upon sugar-free bouillon as a medium, but controlled by all the other cultures on the chart. C–21 has consistently failed to give the nitroso body, though it should do so, as the *Sp. choleræ* is supposed to always give the cholera-red reaction. Whether this failure is due to the reaction of the media or not I am unable to say. *Spirillum choleræ* acts to best advantage in an aklaline medium. The reaction of most of the media used in these tests was neutral. It is a possibility to have in mind, however, in the identification of suspected cholera. It is generally considered that a negative cholera-red reaction is of more importance in excluding than is a positive in confirming a cholera culture. This is true only when the reaction of the media upon which the determinations are made is considered. Where cholera agglutinating sera of high titre are available, culture characteristics are of small importance in the identification of the spirillum, but it is not difficult to imagine conditions under which culture characters alone would have to make the bacteriological diagnosis, and it would be a grave error to exclude spirilla not giving the nitroso-indol reaction without taking into consideration the reaction of the media used in making the determinations.

We have not tried the more recently described method of bringing out the indol reaction, viz, with paradimethylamidobenzoldehyde and potassium persulphate. It would seem unlikely, however, that this method would overcome all the fallacies inherent to the indol test.

THE TAKING AND PRESERVING OF AGGLUTINATING SERA.

In regard to the second part of this "shotgun" paper—viz, that relating to agglutinating sera—it will be recalled that agglutination as a diagnostic procedure in the bacterial types of dysentery offers

some differences from the same procedure when applied to typhoid fever. In the first place we are dealing, in dysentery, with at least two types of organism which interagglutinate very poorly or not at all when one strain is subjected to a serum produced by the other. For this reason, and also because agglutinin appears more slowly in dysentery than in typhoid, it is not customary to use a stock dysentery culture with which to try the patient's serum. The standard procedure is to isolate dysentery bacilli from the stools, verify the organism culturally, and then try its agglutinative capacity against such sera as we may have. Sometimes we are forced to try a Shiga serum against an acid-producing type of dysentery bacillus, or vice versa. If we have both types of sera or a polyvalent serum we are more fortunate, but from a somewhat extensive attempt to secure both types of sera in Manila I am prepared to say that they are not always available commercially, and so one is forced to prepare his own agglutinating sera. It is notoriously a difficult procedure to immunize small animals to the bacillus of dysentery, particularly to the Shiga strains. We often find that about the time we have produced a good serum our animals die and all our work is lost. It is not feasible for every laboratory to keep a couple of dysentery horses or even goats. These animals, too, offer the further disadvantages that their sera will often contain normal agglutinin, which will operate in dilutions higher than the sera of patients who have recovered from dysentery. The commercial agglutinating sera, if in fluid form, are likely to become infected if the container is opened very often, and to prevent this it is necessary to use preservatives. While the presence of these preservatives is perhaps not detrimental, at least the knowledge of their presence does not add evidence to the specificity of any reaction we may obtain. On account of this I believe it is customary with some of the German laboratories to desiccate their specific sera and market them in this form.

There is another difference between the diagnosis of dysentery and of typhoid by agglutination, and that is in the fact that, whereas in typhoid we use easily agglutinable stock cultures, in dysentery we are dealing with newly isolated cultures, which are usually much more difficult to agglutinate than are cultures run through numerous generations on artificial media.

Agglutinins as a class are not only thermostable, but they resist deterioration on drying much better than do receptors of the first order, and quite as well, if not better, than do bacteriolysins and hæmolysins. In preserving hæmolytic sera dried upon filter paper it is often noticeable that the capacity to agglutinate red blood cells by this dried serum persists intact after the hæmolysin has begun to lose its potency. It is fair to assume that the agglutinins of bacteria are as stable as are the agglutinins of red blood cells.

It was Noguchi, I believe, who first used filter paper with which to take up and preserve immune hæmolytic serum. He used it for complement and hæmolysin in his test for syphilis. But complement does not keep well in this way, and it is useless to try to keep it. I have not seen any literature referring to the use of filter paper for preserving agglutinative sera of immune animals or of human sera from recovered cases. There doubtless is such literature, but I have not made a search for it. The method seems to me of some importance in view of the difficulties enumerated above. The method I have used to some little extent is to draw the blood from selected cases of dysentery or typhoid which show agglutinative sera of good titre, take it up in a good quality of filter paper of uniform size, and preserve it in perfectly dry condition over calcium chloride. The apparatus used for taking blood is one which I first saw used in 1908 by Stimpson or Miller, I do not recall which, in the Hygienic Laboratory at Washington. It has been more recently described by Whitmore [3], by Balfour [4], and by Stitt [5], and will not be described here any further than to say that it is a thoroughly useful apparatus for taking blood aseptically from an animal's heart without damaging the animal, or from the arm veins of a human being, in which latter case almost any quantity of blood up to a pint can be gotten with little or no discomfort to the patient and in a thoroughly aseptic condition.

Having taken the blood, it is set in the incubator with the flask tilted so that the clot will be on one side, and although it usually does not remain in this position after clotting and the flask is righted, yet the serum is more easily drawn off without color if this is done. Emery [6] states if clotting is allowed to take place in the 37° incubator that a greater yield of serum will result. From a considerable trial of this technique I am convinced that what he says is true. After leaving in the incubator for about an hour the flask is set in the ice box until the following morning, and the clear serum is pipetted into wide test tubes. Strips of sterile filter paper 1 by 10 cm. are then immersed singly into the serum and dragged up the tube's side so as to drain off all excess of serum. These are laid side by side upon a piece of sterile flannel, the whole is covered with one layer of sterile gauze, the four corners weighted down, and the paper is fanned dry with an electric fan. When all gross moisture is gone (this takes about three hours fanning) the strips are placed in open-mouthed bottles in which there has been placed first a layer of pure calcium chloride, then a layer of absorbent cotton, and then a layer of filter paper. Upon this latter the strips stand.

If the bottles are kept tightly corked the strips will keep as crisp and dry as could be desired for an indefinite time. Moulds and

bacteria will not grow upon the paper so long as it is kept absolutely dry, and this end may be furthered if the containing bottles are kept in a desiccator with calcium chloride and the desiccator kept in the cold.

The agglutinative value of this paper may be ascertained by making emulsions of the particular organism from agar into a series of tubes with a known quantity of normal salt solution. Now drop varying lengths (from 1 mm. up) of the paper into the several tubes of the series and note the shortest length which will give good agglutination microscopically. It may also be gotten by accurately measuring the serum before immersing the strips, and then by noting the number of strips we can calculate the actual amount of serum which each strip holds. This should be calculated each time and the serum content of the paper noted on the bottle. The filter paper of Carl Schleicher and Schüll No. 595 will take up $\frac{1}{8}$ c. c. of rabbit's serum for each 10 sq. cm. of paper, provided there is no excess. It varies within small limits for different sera. In making up the bacteria emulsions for estimating the titre of a serum it is well first to allow the proteid in the paper to dissolve out, aided by agitation, and then remove the piece of paper; otherwise bacteria and blood cells tend to clump upon the paper itself. After this the bacteria are emulsified in each tube.

It may be claimed that agglutinative sera prepared from human cases would not be potent enough. But we can select sera that are potent enough. I think that a serum from a recovered case of dysentery, which would microscopically agglutinate dysentery bacilli within an hour's time in dilutions of 1–100 would be well within the zone of specificity. Human sera of much higher titre than this are not uncommon. It is well to remember, too, that by no means all of the contrary results obtained in agglutination are to be explained on the basis of coming within the zone of normal agglutinins. Ohno [7], using high-titre rabbit's sera, found that those produced by acid strains of *B. dysenteriae* agglutinated Shiga strains in just as high dilutions as they did the strains which produced them and vice versa. Now this is exactly the reverse of what most observers have noted when working with actual cases of human dysentery. The knowledge of this is one reason, as noted above, why we do not use stock cultures for the diagnosis of bacillary dysentery by agglutination. It would seem to absolutely disprove Ohno's findings. It is difficult for me to understand how sera of low potency are any the less specific than are sera of high potency, provided we get outside the usually recognized zone where agglutinins normal to the individual are likely to interfere with our results. Adami and Chopin [8] have written upon a simple method of isolating forms from water which agglutinate with typhoid serum. Oscar Klotz, Frost, and

others have shown the same thing. So that it would not seem a feasible thing to use agglutinative capacity as a means of classifying bacteria. Agglutinins are not absolutely specific, and it makes no difference whether they be of low or high potency. We often see in animals a low capacity to produce bacteriolysins and haemolysins. Some animals are useless for this purpose, as they can not be made to produce active bacteriolytic nor haemolytic sera. The same is true with regard to the production of agglutinins. If it is difficult to get animals to produce like quantities of antibodies, it is also difficult to get bacteria of the same species to consent to be agglutinated in exactly the same dilutions. Therefore, if agglutination were used to classify bacteria the number of species resulting from any one stem would then be determined by the number of "acute and chronic observers" who worked upon it and the number of dilution in which each one found it capable of agglutination when using his particular serum. It is safe to say that our textbooks on bacteriology would have to be enlarged.

In a recent issue of the Journal American Medical Association, W. H. Sawyer [9] reports the isolation of a strain of *B. typhosus* from the stools of a carrier which when isolated failed to agglutinate in a dilution of 1–50 against a specific serum. After 11 generations, during two weeks the organism came to agglutinate with the same serum in a dilution of 1–1,000,000. It would take a mathematician to work out how many strains the "agglutination classifier" would get out of this one organism. What I wish to say is that I think we should consider the matter of agglutination reactions from a saner viewpoint. That we should look at it much as we appraise the blood count in a suspected case of appendicitis as one symptom which, viewed with others, in the large leads us up to the fact.

AN ORGANISM OBTAINED FROM ARTESIAN WELL WATER.

As to the last item of this paper—that relating to a lactose-fermenting organism isolated from artesian well water—it is to be regretted than an exact determination of the organism has not been made, as I am unable to give it a name, although some of its characters will be briefly described.

In the United States the *B. coli* test as the control of the effluents from filter beds, and as an index of a fæcally contaminated water is accepted as at once the most convenient, and of the single tests the most dependable. It is likewise true that the colon test is considered as a reliable one by water bacteriologists in England, where perhaps they have had more experience with it than we in the United States. The test has its drawbacks, as has every test, whether chemical or bacteriological, single or combined. One of these drawbacks is the

difficulty in every case of defining just what constitutes the typical colon bacillus. Another drawback lies in the fact that a large percentage of all waters will, if taken in sufficient quantities, show organisms of the colon class. This refers particularly to the product of watersheds which are used as pasturage ground for animals or to which wild animals have access. Another drawback is the lack of knowledge as to the relative lengths of time which the colon bacillus will live outside the body when compared with the saprophytic persistence of the organisms which it is supposed to control, chiefly those of typhoid, cholera, and dysentery. To offset these shortcomings, standards have been established as to just what constitutes the *Bacillus coli*, and as to the quantities of water below which it is not permissible that organisms of the colon class should be found. In spite of these standards, which vary slightly in different countries and with different municipalities, there is much that is desirable to know about the way a water is taken, and its preliminary treatment before condemning or passing any given water upon the colon test alone. Furthermore, because the colon test is adequate for the waters in temperate climates, it does not necessarily follow that such is the case in the Tropics. Its adequacy indeed has been called in question by Clemensha [10] and his associates for the waters of India. But it is to be said against this finding that many of the waters considered in Clemensha's report are not comparable to water supplies of Europe and America. It does not take the assistance of a bacteriologist to condemn the water of sewage-contaminated streams, and until conditions of impounding, sedimentation, and filtering of waters in the Tropics are similar to those used where the colon test controls results, it is hardly fair to condemn the test as we are not comparing results obtained by similar means.

The Committee on Standard Methods of Water Analysis of the American Public Health Association [11] prescribes the following as diagnostic characters for *Bacillus coli:*

1. Typical morphology—nonsporing bacillus, relatively small and often quite thick.
2. Motility—when a young broth or gelatin culture is examined.
3. Nonliquefaction of gelatin.
4. Fermentation of dextrose broth, with the formation of about 50 per cent of gas, of which about one-third (CO_2) is absorbed by a 2 per cent solution of sodium hydrate.
5. Coagulation of milk with the production of acid in 48 hours or more at 37° C., either spontaneously or upon boiling.
6. Production of indol in peptone solution.
7. Reduction of nitrates.

Every item here enumerated requires explanation, and every one of us who has used them knows that it requires more than is here

enumerated to decide the question. Lactose as a carbohydrate is much more important than glucose, and when combined with bile it forms one of the best presumptive tests we have for *B. coli*. Jackson and Melia [12] have stated that in this medium *B. coli* and *B. typhosus* outgrow all other organisms, and that eventually the typhoid bacillus outgrows the colon bacillus. There have been other improvements in isolating the organism from water since the above tests were recommended, but there is still much to be desired.

The artesian well from which the organism in question was isolated is a cased well 486 feet deep and driven into sandy soil. It is situated at about the central part of the Cañacao Hospital inclosure. On the east side, at a distance of 200 yards, is Cañacao Bay, and on the west, at a distance of one-half mile, is Manila Bay. The nearest native dwelling is some 400 yards from the well's mouth. The sewage from the hospital buildings, which surround the well on the east, south, and north sides, is discharged into Cañacao Bay. There are no dwellings on the west side of the well. The well is not free flowing, but even in the driest season furnishes enough water to keep a 100,000-gallon tank constantly full. The consumption runs about 64,000 gallons per day.

The bacillus obtained from this water was isolated on one occasion from water at the mouth of the well before going into the tank for distribution. The smallest quantity from which it was here obtained was 20 c. c. At another time it was isolated from one of the distributing pipes in quantities of 10 c. c. On both occasions the plants were made into lactose bile and fermentation was evident with gas production only after 48 hours. Plates were made using lactose litmus agar, and the red colonies fished gave the following cultural and microscopical characters: On plain agar plates the bacillus grows as an almost colorless colony by transmitted light and whitish or gray by reflected light. It does not heap up quite so much as the colon colony, and growing out from the primary nucleus is usually a thinner smoky film. On a plain agar slant the organism does not spread much from the line of stroke, and there is no diffusible color even after days. On a Russell's tube it reddens the surface and in a stab flows the medium to a moderate degree. On the surface of this medium the bacillus produces a glairy mucous-looking growth. In the butt of the tube, after a few days, the color is lost. On potato there is abundant growth, which is brownish after a couple of days. It is elevated and shows a few bubbles of gas.

The organism reduces nitrates to nitrites, but produces no indol in peptone solutions.

It has not been possible to ascertain the action of the organism toward gelatin, but upon blood serum there is an abundant white

growth, with small pointed projections at the border. There is no liquefaction of the blood serum up to seven days.

In bouillon there is diffuse clouding with little tendency to pellicle formation. The organism remains actively motile in this medium for several days, even at incubator temperature. It is much more motile than any colon culture I recall having seen.

Litmus milk is reddened and coagulated in 24 hours. A firm clot forms, which eventually turns perfectly white. Gas bubbles will rise from the interstices of the coagulum for several days upon slight agitation. The clot is not digested.

Morphologically the organism is not typical of *B. coli.* It is not so broad nor so long, and although round ended it stains more evenly than *Bacillus coli* and does not show the unstained areas often noted with *B. coli.* It is Gram negative.

The Voges and Proskauer's reaction is positive. The following table shows the reaction of the organism toward such carbohydrates as were available. It is contrasted with *B. coli.*

	Glucose.	Lactose.	Maltose.	Mannite.	Saccharose.	Raffinose.	Inulin.	Arabinose.
C-99[1]	A. G.	A. G.	A. G.	A. G.	A. G.	A. G.	....	A. G.
B. coli	A. G.	A. G.	A. G.	A. G.	....	A. G.	....	A. G.

[1] C-99=the organism from well.

It will be seen that in its carbohydrate reactions the organism is close enough to *B. coli* to come within the group. It does not seem to produce gas in lactose and saccharose to anything like the extent it does in the other carbohydrates shown in the chart. Doubtless it would be classed as a type of *B. coli* by others. But taking into consideration the slight fermentation differences from *B. coli* on carbohydrates, the lack of typical colon morphology, the greater motility, the lack of indol production, I feel pretty safe in saying that the organism is not *B. coli*, although it is fully appreciated that the differences noted are possible with organisms of the colon group. With the ideal surroundings of this well it is difficult to see how *B. coli* could get into the water unless there was some break in the casing. If there were no break in the well's casing it is impossible to see how *B. coli* could get into it, for even though the height of the water in the well represents simply the height of the ground water, in other words, if it is simply a deep seepage well, it is hard to see how surface bacteria could filter through some hundred feet of sand and appear in viable form at the well's mouth. It seems likely that the organism multiplies in the distributing pipes, since it requires twice the amount of water to get it at the well's mouth as it does after going through the pressure tank. It is probable that the organism is a

saprophyte which has grown backwards, contaminating the piping, perhaps for some distance into the well. That saprophytes in the Tropics may be found capable of ready growth at 37° should, I think, be expected, since they have evoluted under conditions of greater heat.

There has not been very much work published bearing upon the sanitary examination of tropical artesian-well waters. The most extensive publication I have seen is that of Balfour upon artesian-well waters at Khartum. In one of the wells the water of which was considered in this report there was pretty constantly found a lactose-fermenting but chromogenetic organism. This organism was identified as *B. proteus fluorescens*, and neither Balfour nor Dr. A. G. Houston, of the metropolitan water board, London, thought that the presence of this organism should condemn the well. Balfour at another place in this report mentions isolating a nonchromogenetic lactose-fermenting proteus-like organism from the Khartum water. He believes in the adequacy of control offered by the colon test for tropical waters.

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TRAUMATIC DISLOCATION OF THE PATELLA.

By Morris B. Miller, assistant surgeon, Medical Reserve Corps, United States Navy.

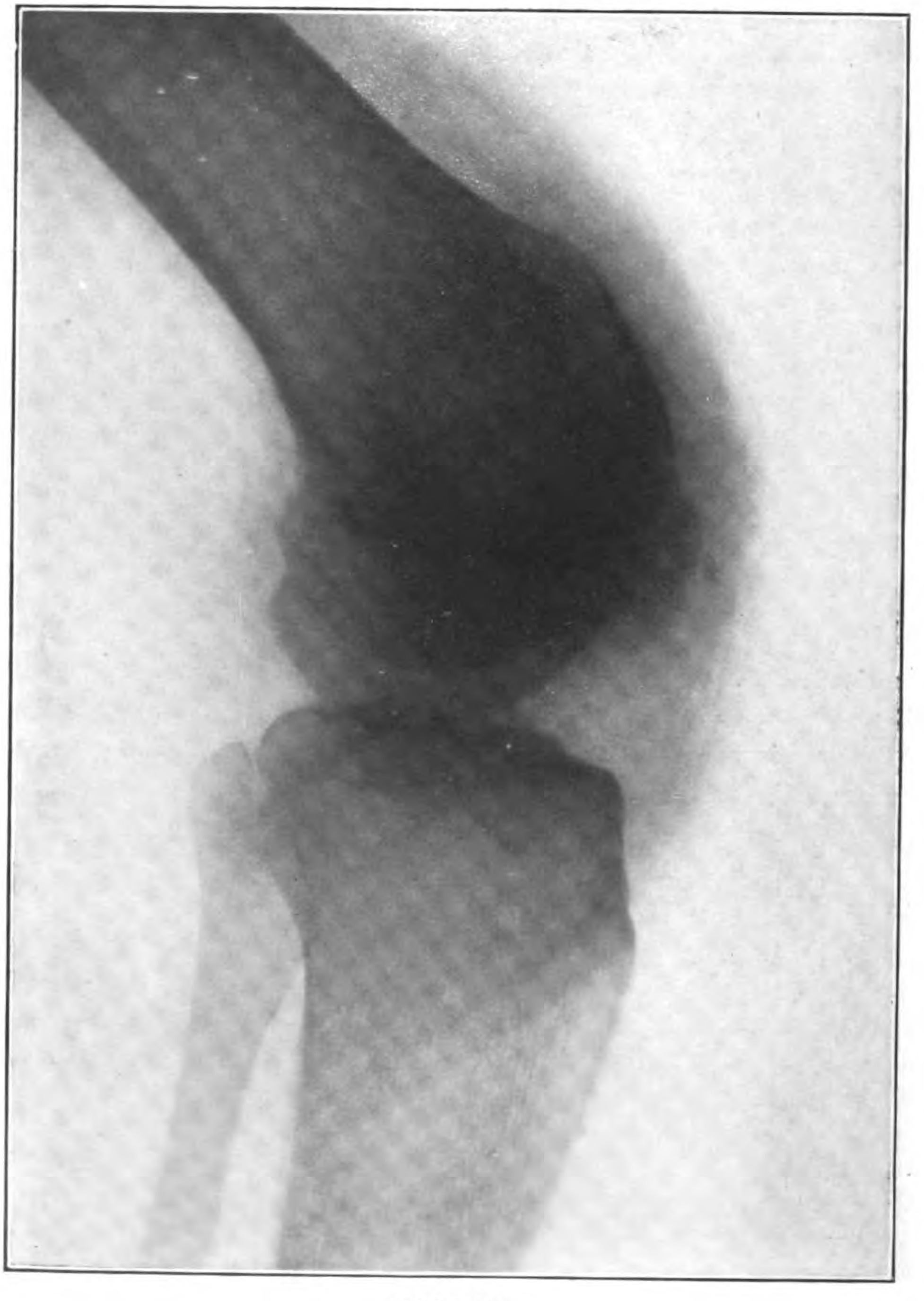
Among the rarest of luxations is that of the patella. According to the English surgeon, Mr. Makins, of 812 dislocations of all varieties seen at St. Thomas's Hospital, 3 were of the patella, while Krönlein saw a similar number among 400 dislocations, the percentages being 0.24 and 0.75, respectively. Three forms occur, (I) lateral displacement, (II) rotary displacement, and (III) backward displacement, with wedging of the patella between the femur and tibia. Some

writers are disposed to add a fourth form, that of the upward displacement which follows rupture of the ligamentum patellæ, but the nature of this lesion is obviously different, and it should not be classified with the true dislocations.

Lateral displacement is the most common form observed, and it may occur inward or outward and may be complete or incomplete, depending upon whether the patella is in contact with the condyle or still touches the joint surface. Inward luxation is exceedingly rare, and this rarity may be attributed to definite anatomical causes. The inner condyle is of greater size and more rounded shape, and an inwardly displaced patella can not find a sufficient hold upon its rounded surface and is quickly drawn back to its normal site by muscular traction; furthermore, the inner edge of the patella is thicker and, therefore, more exposed to violence; and, finally, in the normal leg the extensor apparatus lies a little to the outer side of the midline and hence outward displacements can more readily occur. According to Streubel, tendon rupture, partial or complete, must occur in the normal limb before inward luxation can take place, but in the presence of relaxed ligaments of the knee joint it is possible for the patella to be completely displaced upon the lateral aspect of the internal condyle without rupture of either the quadriceps or patellar tendons.

Outward displacement is met more frequently than all the other varieties put together. It usually is seen as the result of a direct blow to the patella with sudden forcible contraction of the quadriceps, while the knee is bent and perhaps turned inward. It may, however, follow a direct blow on the bone when the knee joint is fully extended, doubtless always with the coincidental spasmodic contraction of the muscle. If incomplete the symptoms are relatively obscure and the condition may be diagnosed as a severe knee sprain, though on close inspection the patella will be found external to its usual location, but when complete the pnenomena are clear-cut and the deformity marked. In direct ratio to the completness of the luxation the capsule is torn longitudinally, and occasionally the extent of this tear may be felt through the skin after the initial swelling disappears. The knee is somewhat bent inward, slightly flexed, and there is a tendency to outward rotation of the foot. It is flatter and broader than normal and this is accentuated by flexion. The patella is found on the outside of the condyle, usually a little higher than its former level. The trochlea is empty and the sharp edge of the tibia is especially prominent. The quadriceps and patellar tendons are palpably tense and instead of being in a relative straight line form an obtuse angle to each other. The degree of disability arising from this injury is surprisingly slight, and patients are able to walk in the majority of instances. With early reduction perfect functional

FRONT VIEW.



SIDE VIEW.

recovery usually follows, and even in the cases where reduction is not done gradual recovery progresses until a very fair measure of usefulness is attained. There is, however, in the unreduced cases some diminished power in full extension and a tendency to genu valgum. A few cases have been noted where there was repeated recurrence of the displacement after reduction, and in these, characterized as habitual patellar luxations, the condition may be attributed to the persistency of the primary tear or relaxation of the capsular ligament and particularly to genu valgum which is always present and well marked.

A much rarer form is that of rotary displacement, where the patella is rotated on its long axis and stands vertically on its edge in the intercondyloid notch, or, in extreme cases, it may turn completely over so that its cartilage covered surface is beneath the skin. Among 120 cases of patellar luxation collected by Streubel 21 were of this type. The rotation may occur inward or outward with equal frequency, and there is tearing of the capsule longitudinally on the side from which the patella rotates, or in the instances where the bone is completely reversed the capsule is torn on both sides. The causative factors are much the same as in lateral displacements. There is direct violence upon the inner or outer edge of the patella with sudden tightening of the quadriceps while the leg is abducted or adducted and somewhat rotated. The symptoms are definite and striking. The limb is extended and voluntary movements are restricted and attended with decided pain. The vertical edge of the patella projects forward and forms a ridge beneath the skin. The connecting tendons are visibly and palpably tense and the tear in the capsule can be felt. When complete reversal takes place a double capsular tear may be made out, the tendons are overstretched, and the vertical ridging on the articular surface of the patella can be felt through the skin.

The third type, that of backward displacement with wedging of the patella between the femur and tibia, is so infrequent that only four cases have been placed on record. In these cases the patella was driven into the joint by rotation on its transverse axis and the articular surface faced upward. The knee was flexed and passive extension was impossible. In Szuman's case, which is accepted as typical, the crucial and external lateral ligaments were ruptured, while in the others there was tearing of the quadriceps tendon.

Treatment.—In lateral luxations in the recent case, reduction is usually easily accomplished by anesthesia and manipulation, with the leg extended and the thigh flexed on the pelvis. Sometimes it is necessary to alternately flex and extend the knee while simultaneously pressing upon the lateral aspect of the patella. Immobilization for 10 to 14 days generally suffices for the after treatment. If the displacement recurs a longer period of rest is required and some form

of protective apparatus should be worn for several months. Habitual dislocation requires operation. This involves the narrowing of the capsular ligament either by the removal of an oval piece, or, better still, by plication of the relaxed portion. In some cases, especially where a material genu valgum exists, it may be necessary to chisel off the tibial tubercle and nail it to the inner surface of the tibia in order to overcome the tendency toward outward slipping. Dr. F. E. Bunts, of Cleveland, in an extremely aggravated case of double habitual luxation, in which the patient was practically helpless without crutches, secured a fairly satisfactory result by overlapping the vertically incised capsule after the method devised by the Mayos for the radical cure of umbilical hernia. When an old, unreduced case presents itself it should be carefully borne in mind that the function is not greatly impaired as a rule, and that an injudicious operation may leave the limb worse rather than better.

In many cases of vertical displacement reduction is easily done by manipulation with the limb hyperextended and raised, after first determining whether the patella has rotated inward or outward and directing the efforts accordingly. Inasmuch as this accident is highly disabling, in the event of failure to reduce by this method it is obligatory to proceed to open operation. By longitudinal incision and the use of an elevator or a hook reduction may be done, and should be followed by suturing of the torn capsule and closure without drainage. With complete reversal, operation is always indicated, and if reduction is not possible the patella should be removed at once. If this is done by the subperiosteal method the function of the knee joint or of the quadriceps muscle is not seriously impaired.

In the cases of backward displacement operation was successfully done on all four patients. The ligamentum patellæ was divided to secure relaxation and exposure, the patella was lifted from the cleft between the femur and tibia, and the ligament was again sutured into place after the torn capsule was repaired.

The accompanying radiographs were taken of a 28-year-old man who was under the care of the writer at the Philadelphia General Hospital during December, 1912. They show an anteroposterior and a lateral view of a complete external lateral luxation of the patella.

FURTHER OBSERVATIONS ON THE VALUE OF STUDYING THE PULSE RATE WITH THE BLOOD PRESSURE IN CROUPOUS PNEUMONIA.

By H. A. HARE, assistant surgeon, Medical Reserve Corps, United States Navy.

At a meeting of the College of Physicians of Philadelphia, in 1910, I read a paper in which I confirmed, from observations in this country, the statement of Hill that the relationship between blood

pressure and pulse rate afforded valuable information as to prognosis and treatment in croupous pneumonia. To express it more exactly, the point is that when the pulse rate per minute is greater than the blood pressure in millimeters of mercury the patient is in grave danger, and that even when the numbers are equal he is seriously ill. Further observation confirms this statement in croupous pneumonia in adults as a class, and I still believe that the comparison of the blood-pressure curve and the pulse-rate curve is a valuable guide to treatment. But just as there is no one dose of any one drug which will suit all cases, so it is also true that no one symptom or syndrome will prove of absolute value in every patient. My object in presenting this present paper is to point out some of the exceptions to the rule. The test loses its value, to some extent, in the following classes of cases:

In old people who have hypotension, as a result of their age and feebleness, before they are taken ill. Such cases also often fail to present that other tripod of croupous pneumonia, namely, the slow pulse, rapid respiration, and high temperature.

The second class in which it fails is in children, in whom the blood pressure is naturally low, so that the pressure and pulse rate are normally nearer together than in adults.

The third class is in stout, flabby women, who may be said to present some of the signs of a mild hypothyroidism.

The fourth class is represented by those cases in which the pneumonia is a sequence or complication of a severe illness like typhoid fever.

The fifth class is represented by pneumonia complicating diabetes. In all of these five classes the relative slowness of the pulse rate, as compared to respiratory rate, is also usually lacking.

None of these exceptions, however, diminish the value of the sign under discussion in primary croupous pneumonia, or in that complicating the two forms of nephritis commonly met with.

In catarrhal pneumonia, in which the relative disproportion of pulse rate and respiration seen in croupous pneumonia is also absent, the sign described by Hill and myself is also of less value, unless the catarrhal pneumonia occurs in a case of hypertension arising from a previously existing vascular spasm or arterio-capillary fibrosis, when it is of value.

Finally, I would like to call the attention of surgeons to the importance of studying the relation of pulse rate to blood pressure before, during, and after operations in adults, and particularly in adult males, as a guide to stimulation and as to the wisdom of proceeding with operative interference.

TREATMENT OF FRAMBESIA WITH SALVARSAN.

By E. U. REED, passed assistant surgeon, United States Navy.

This disease, while seldom fatal in itself, is very debilitating and its subjects present a most repulsive appearance (see fig. 1).

Potassium iodide has some specific action, but only a small proportion of the Samoans will persist in its use until more than a slight and temporary improvement has resulted.

In conjunction with pyogenic organisms it has also produced many of the large chronic ulcers which have been so hard to cure.

From September 1, 1911, to April 1, 1912, 83 cases of frambesia were treated at the naval station, Tutuila, Samoa, with salvarsan. These cases all occurred among the Samoans and half-castes, who have looked upon this infection as an inevitable disease of childhood.

In 77 of these cases the *Treponema pertenue* was demonstrated by the india-ink method. Of the remaining 6 cases, the lesions were so characteristic in 4 that no attempt was made to find the organisms, and in two they could not be found. These last two cases will be described separately as late or tertiary yaws.

The salvarsan was neutralized with 2 per cent sodium hydrate solution and injected into the muscles of one buttock. The skin was scrubbed and a dressing applied on the preceding day in the earlier cases. In the later ones this was found to be unnecesary and injection was made through an area having no other preparation than two coats of tincture of iodine.

Complete and permanent cures have been recorded in 53 cases. In practically all of these cases the yaws lesions dried up rapidly, the crusts fell off, and in 8 to 10 days the only traces of yaws were red discolorations of the skin where previously had been large, elevated masses of tissue.

Twenty-four cases were lost track of before complete cure had resulted. Ten of these were noted as "healing fast" or "lesions dry and nearly healed," when last observed. Delay in complete cure was frequently due to associated pyogenic infection of yaws lesions, particularly on the legs. The remaining 14 cases have not been seen since the injection (over five months ago). They were instructed to return in case of failure of treatment or relapse.

The doses given for the different ages depended somewhat upon the severity of infection and the strength of the individual. They can best be demonstrated by the following table:

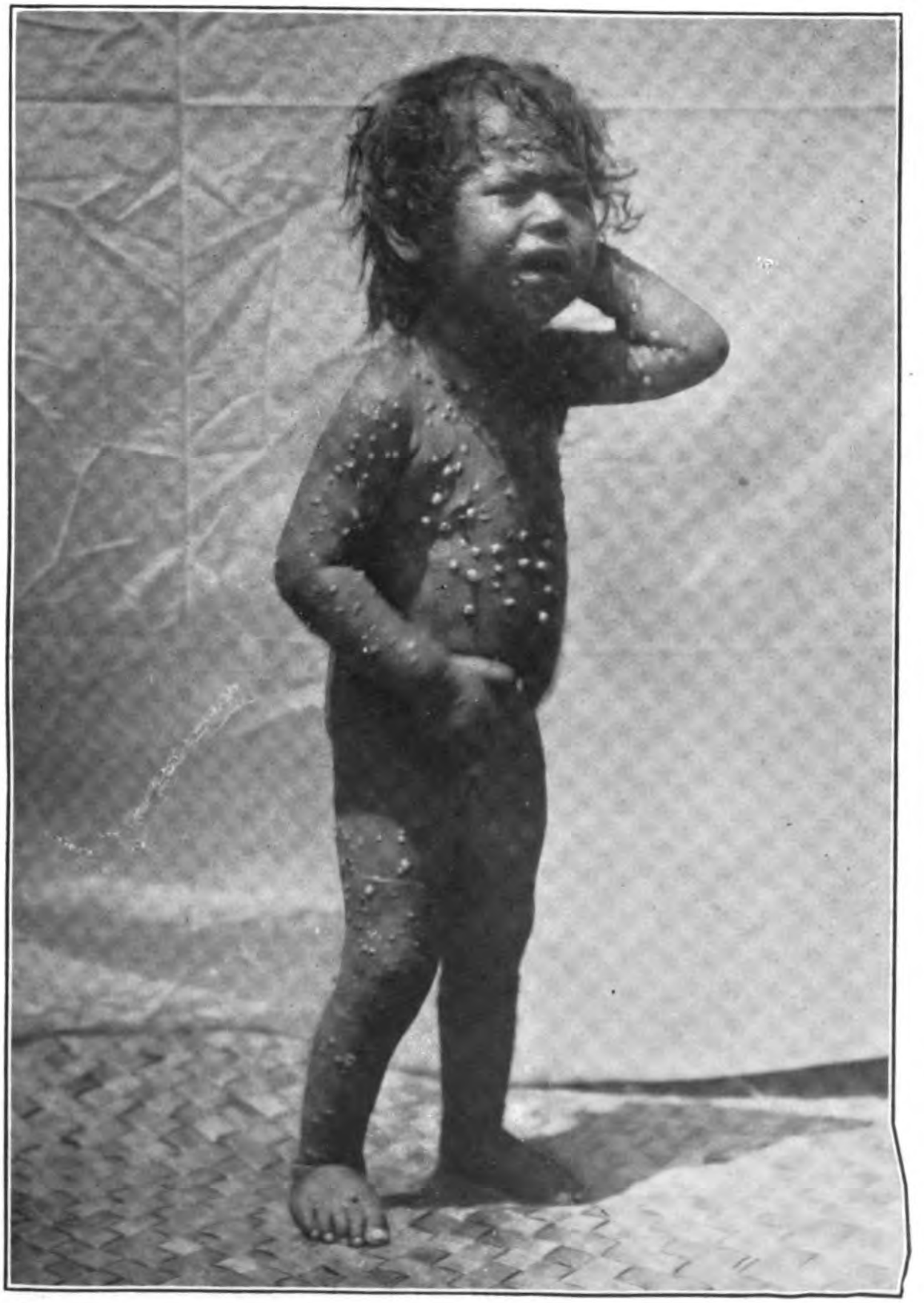


FIG. 1.

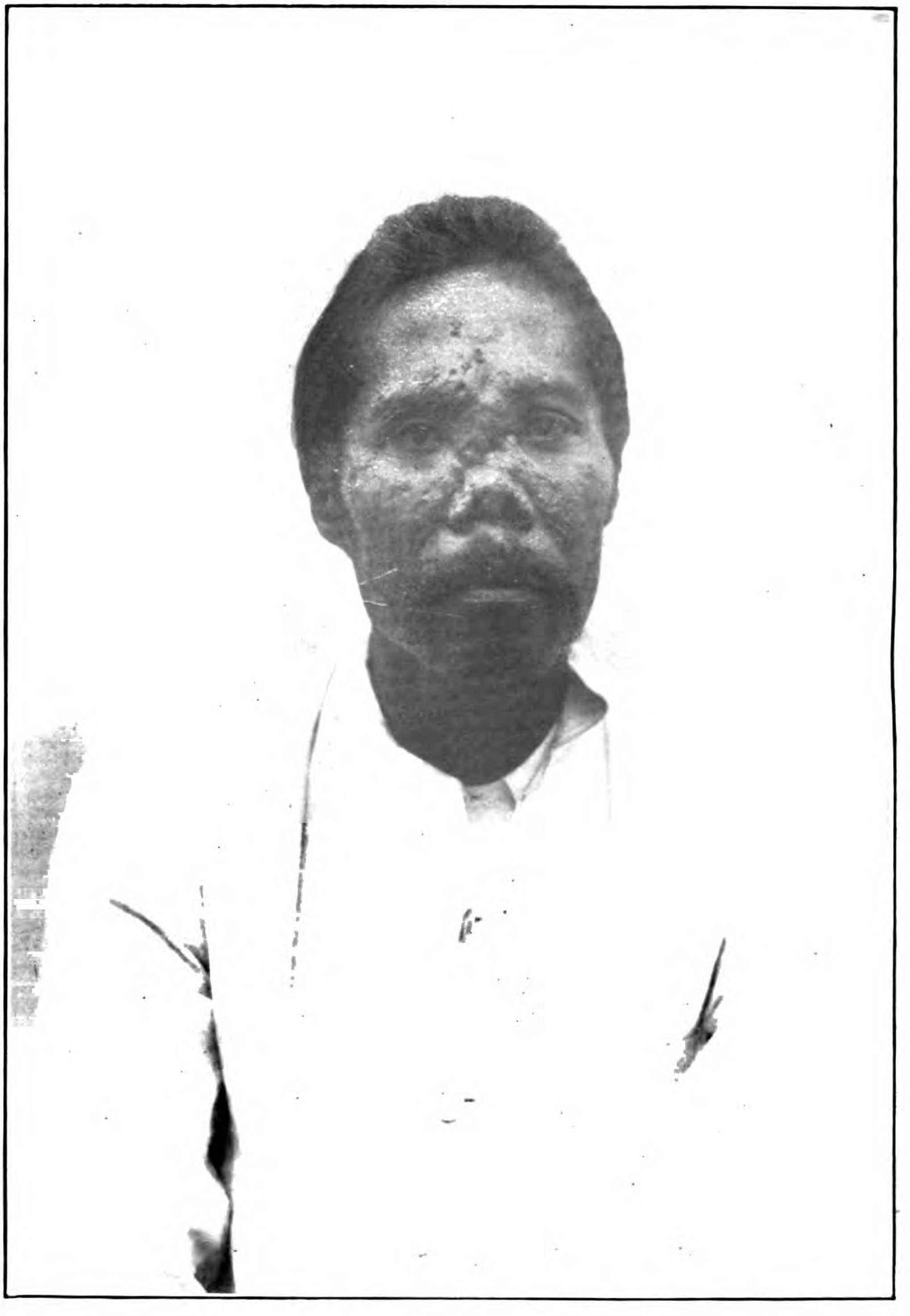


FIG. 2.

Table of doses and results.

Age.	Number treated.	Salvarsan.	Cured.	Not reported.	Relapse or reinfected.
		Gram.			
6 months	1	0.1	1	0	0
8 to 9 months	5	0.1 - .15	4	1	0
11 to 13 months	7	.15 - .2	4	3	0
16 to 19 months	13	.15 - .25	8	4	1
22 to 24 months	11	.15 - .3	6	3	2
2½ years	3	.2	2	1	0
3 years	15	.175- .3	10	4	1
3½ years	1	.2	0	0	1
4 years	8	.175- .3	4	3	1
5 years	5	.175- .3	3	2	0
6 years	4	.3	3	1	0
8 years	4	.2 - .4	4	0	0
9 years	2	.3	2	0	0
12 years	1	.4	0	1	0
Adults	3	.5 - .6	2	1	0
Total	83	....	53	24	6

Six cases of relapse or reinfection have been observed. Two of them, recurring in about three months after disappearance of the lesions, received small original doses. The lesions reappeared in four, four, seven, and nine months after apparent cure in the other four cases. It is probable that in some of them reappearance was due to reinfection and not to failure of treatment. Four of these six cases were reinjected with larger doses of salvarsan, and rapid healing resulted.

In one case sloughing occurred at the site of injection. There was no evidence of suppuration and the yaws lesions healed rapidly. After extrusion of the hard yellow slough the buttock healed satisfactorily.

One child, age 2 years, was seen three months after cure with paresis of right thigh, and the parents claimed that the leg had been weak since the injection into the right buttock. This child was apparently suffering from malnutrition and heavy infection with intestinal parasites, and was taken away without further opportunity for observation or treatment.

LATE OR TERTIARY YAWS.

Case 1.—Mou; male Samoan; age 27 years. Onset in 1910 with pain in nose and running discharge. Nose became flattened and discharge has continued to the present time (December 15, 1911). Bridge of nose is very flat, cartilaginous septum is absent and right ala nasi is very thick, almost completely closing the nostril. It has a flat anterior margin covered with a characteristic yaws crust. The hard palate shows several tubercular nodules and two depressions. Salvarsan was injected (0.5 gram) on the above date, and on January 29, 1912 (when next observed), the nose was entirely healed and the discharge and pain had stopped. No other treatment was used. Repeated attempts were made to find the treponemata, without results.

Case 2.—Manuia; male Samoan; age 40 years. About two years ago his nose began to flatten and tubercular lesions appeared on his face. He has considerable pain in his nose, which is now very flat, and the cartilaginous and part of the bony septum are absent. He has a number of tubercular lesions on face and a few lesions resembling yaws (see fig. 2). Repeated examinations for treponemata have been negative. Salvarsan (0.6 gram) was injected into one buttock on February 29, 1912. On July 10, 1912 (when next observed), all lesions were healed except a small one on his forehead, and he stated that pain stopped and healing began right after injection.

No syphilis has ever been recorded as contracted in American Samoa to my knowledge; and I have seen no cases of syphilis among the Samoans after holding large clinics for over a year. These men gave no history of trips to ports where syphilis is present.

Another late form of yaws occurs in the bottom of the foot and is very painful and persists for years. It appears as a round flat growth protruding through the thickened skin of the sole and causes considerable limping. These are often the only yaws lesions present and occur more frequently in adults and older children. They respond promptly to single injections of salvarsan.

No abscesses have been observed in any of this series of cases and none have developed any alarming symptoms. During the last two months an emulsion of salvarsan in liquid petrolatum has been injected with a special syringe and large caliber needle. This has diminished considerably the pain at the time of injection and the later tenderness and induration of the buttock.

These treatments have been given during clinic hours and with very little trouble or delay. Since April 1, 1912, 87 later cases have been treated with this remedy with equally excellent results.

Children covered with large repulsive yaws lesions were frequently seen in the villages and around the naval station last year. They are now seldom seen except at clinics, and a recent tour of inspection of the island shows that this disease has been greatly diminished.

CUTANEOUS ANTHRAX, WITH REPORT OF A CASE.

By E. C. White, passed assistant surgeon, United States Navy.

Anthrax among the domestic animals has been recognized from early historic times, but it was not until the latter part of the sixteenth century that contagion from animal to man was suspected, and not until 1780 that Chabert first described cutaneous anthrax and separated it from other septic and gangrenous diseases of the skin. He showed that it was the same as charbon, which was so prevalent in cattle and communicable from them to man.

Anthrax is now prevalent in animals all over the world, but it is least prevalent in North America, South Africa, and Australasia. In

the Philippine Islands Boynton [1] several years ago reported 7 cases in carabao dying in Taytay, Rizal Province, and concluded that it had existed unrecognized in the islands for some time. All classes of vertebrates are susceptible, the herbivora being most susceptible and the carnivora least. Man is midway between the dog and the sheep in susceptibility.

In man anthrax occurs in three forms: (1) Gastro-intestinal, (2) pulmonary, and (3) cutaneous, which is often still called by its old name of malignant pustule. The intestinal form is very rare. The pulmonary form is often known as wool-sorter's disease. It was first noted in Bradford, England, after the introduction of alpaca and mohair as textile materials in 1837. Occasional unusual illness and sudden deaths occurred among the sorters of these classes of wool. In 1880 Dr. J. H. Bell [2] made a report of several cases which led to official inquiry by the local government board and its identification with anthrax. In the worsted and woolen industries of England the prevailing form is now cutaneous, but it was formerly pulmonary. The change in type was ascribed by Bell in 1905 [3] to the fact that less dusty fleeces and hides were being imported into England, that exhaust fans were largely used in the factories, and that dangerous materials were dampened. At Bradford, which is the center of the district in which most of the cases in England occur, they have had a board for the investigation of anthrax for the past six years [4]. During this period 71 cases have occurred, of which 24 were fatal. Of the fatal cases 15 were of the internal type and 9 external. Among hide, skin, and horsehair workers the cutaneous form is almost the only one encountered, the pulmonary being exceedingly rare. Agricultural anthrax is almost solely cutaneous.

Mode of Infection.—The infecting agents may be either the bacilli or the spores. The spores are the agents of greatest danger, because of their great powers of resistance. They form only in the presence of oxygen and most abundantly at 32° to 35° C., though they may form at any temperature between 14° and 40° C. They resist drying for at least 10 or 12 years. They are killed by dry heat at 140° C. in 3 hours and in steam or boiling water in 5 to 10 minutes. Ravenel [5] found that, frozen by liquid air, they were still viable after 3 hours.

The disease occurs [6]: (1) In those who come into contact with living diseased animals; as drovers, shepherds, farmers, farriers, and veterinary surgeons. (2) In those who handle the carcasses of animals dead of anthrax, as butchers and meat inspectors. (3) In those who handle offal, skins, hoofs, hair, horns, wools, and other derivatives, as tanners, woolworkers, hair workers, horn-workers, rag sorters, plasterers, furriers, felt makers, brush makers, mattress makers, etc. (4) In those not directly in contact with infective

materials but who acquire it through the medium of other persons, animals, or insects, as the bite of the fly. In some cases it is impossible to trace the source of infection.

Great Britain is the only country in the world where anthrax is mainly of industrial origin, most of the cases being traceable to spores contained in materials imported from distant countries. In 1908 Dr. Eurich [7], bacteriologist of the Bradford Anthrax Investigation Board, found 10 infected samples in 116 specimens of wool submitted. In 1911 Glyn [8] found the spores in 21.3 per cent of 41 samples of raw hides and wools sent him for examination. It was formerly believed that the dust from the materials conveyed the organisms and that Australasian wool was safer to work with because it contained more natural potash soap, which lessened the diffusion of dust. Eurich [7] has demonstrated, however, that only the blood contains the organisms and that it is the blood-stained wool and hair that convey the infection. Dust, per se, is harmless, and is dangerous only if mixed with scales of dried blood from tainted hair. The amount of blood on the material is a rough measure of its danger. Blood may remain on the wool fibers even after thorough washing. Various disinfectants, as formaldehyde and cyllin, have been tried, but with ill success because of the protection afforded the spores by the matting together of the blood stained fibers. Formaldehyde is the most useful, as it fixes the blood stains to the fibers and so prevents diffusion into healthy fleeces. [4] It is during the "carding" process when the wool is torn apart by high speed machinery, which shoots particles and short fibers into the air, that most cases of anthrax infection occur. It was suggested by the last Bradford board that receptacles for blood-stained fibers be provided and regularly emptied and cleansed, and that workers be trained to search for dangerous materials. There is no special danger in handling the blood-contaminated wool; it is not until the dried clot is diffused by rough handling that danger arises.

Persian and Asia Minor wool are the worst infected, while horsehair, hides, and skins from China, Russia, and Siberia are very badly infected. Legge [9], in 1905, declared that every bale of Chinese mane hair and most of the tail hair was infected. However, the proportion of cases in Great Britain due to agricultural causes is steadily increasing, due to its spread among domestic animals and to its decrease in the industries because of precautionary measures.

The mode of infection is often curious and difficult to trace. In 1886 [10] a case was reported in a female sack maker, who cut out canvas for sacks to contain meat, but had no other connection with any source of infection. In the United States [11] a teamster who handled leather contracted the disease. A number of cases have occurred in the families of the workers when the workers themselves

were uninfected, the infection apparently being brought home to them. Some of these cases were undoubtedly due to infection by means of flies conveying the spores from infected material to pimples or other open sores. Infection has occurred in cases of compound fracture. Paterson [12] reported a case in Glasgow in 1904 of a man who, while mixing hair with lime to make plaster for walls, received a compound fracture of the lower part of the right humerus by being struck by a falling crane. Anthrax infection developed in 24 hours. On the third day the arm was amputated because of gangrene, due to ruptured artery, and the man recovered. The only case I found which closely resembles in its mode of infection the one I have to report was reported in Russia in 1909 [13], it being the case of a railroad laborer infected by handling carcasses while loading cars.

Incubation Period.—The incubation period varies with the method of inoculation and with the quantity and virulence of the poison. If introduced by the bite of a fly or if a scratched pimple is inoculated, the inflammation usually starts immediately. If introduced through a cut or abrasion of healthy skin, the swelling and inflammation will be delayed for two or three days. If the infecting material is fresh and in bacillary form, incubation will be shorter than if dried spores are the infecting agents. When the period of incubation is longer than two or three days it is probable that some of the virus has remained on the skin for some time without finding an opening. When it does, development is usually rapid. The longest incubation periods I find recorded in the literature are the following: In a case reported in England in 1905 [14] a butcher skinned a cow dead of anthrax, and it was seven days before a lesion appeared on his right forearm. He scratched and caused it to bleed, and three days later the symptoms were severe enough to send him to a physician. Roberts [15] reported a case in 1908 of a farm hand who skinned a bullock dead of anthrax and 10 days later developed a lesion on the right forearm and on the following day another on the left forearm. He had washed his hands afterwards and dipped them into an antiseptic solution, but at the time of examination there was a heavy deposit of dirt beneath his nails, and it is not improbable that the bacilli had been lodging there and had not infected the skin until a day or two before he was seen, when he had been scratching his arms a great deal because of the itching caused by a new coat.

Symptoms.—Cutaneous anthrax is often divided symptomatically into the necrotic and the erysipelatous varieties [6]. The usual local symptoms of the necrotic variety are as follows: There is first a painful itching at the site, and within a few hours a red papule with a minute central puncture appears; on the following day a vesicle forms, with some surrounding redness, and beyond this considerable

brawny swelling. The vesicle varies in size from ½ to 2 cm. in diameter and contains a yellow or brownish exudate. By the third day the vesicle has burst and shrunk, leaving a gray or brown base exuding serum. By the fourth day there is a black, dry, depressed eschar, surrounded by a very characteristic, slightly elevated border of small vesicles. Large bullæ may form on the skin around and beyond the margin of the eschar. If the papule has appeared on originally sound skin, there may be no red areola, but there is always considerable firm edema of surrounding tissues. The neighboring lymphatic glands may be tender, hard, and enlarged. If on the neck, the larynx or the cellular tissue and glands of the mediastinum may be involved. In severe cases the edema may extend all over the head, neck, and chest to below the nipples. The general absence of pain around the eschar is remarkable; it is never acute, and is rather a sense of fullness due to the swelling. The lesion is usually single. But in a case quoted above it was double; and in one case, reported in England in 1901 [16], a groom had four lesions on his forearms, all confirmed microscopically.

The erysipelatous variety appears usually at the junction of the skin with the mucous membrane of the eyelids, nose, mouth, or prepuce. There is more extensive swelling than in the necrotic variety, and when severe there is much redness, vesiculation, and a gangrenous discoloration of the skin.

The severity of the general symptoms bears no relation to the amount of local disease; a small pimple on the neck or chin may be fatal within three days, while a lesion on the temple, with swelling all over the head and involvement of the submaxiliary glands, may recover. In some cases of considerable local lesion there are no general symptoms. Usually they set in on the day following the appearance of the initial lesion, or within the next few days, but in less severe cases they may be deferred for a week or more. They are the usual symptoms of a febrile disease—weakness, chilliness, occasionally a slight rigor, thirst, at times vomiting, fullness in the head, restlessness, and disturbed sleep. Later symptoms vary as the disease localizes in various internal organs; as hemorrhages from the stomach and bowels, with persistent vomiting and diarrhea; or, if in the lungs, rapid breathing and a tendency to cyanosis; in the head, violent delirium, convulsions, and coma; in the heart, collapse and death. For several days usually there is no fever and later the temperature rarely exceeds 102° F.

In most of the textbooks and reported cases the leucocyte count is not recorded. Where it is, the findings vary greatly. Royer and Holmes [12] in 1908 made a study of the leucocyte count in 13 cutaneous cases occurring in Philadelphia, due to handling various animal products. Three of the cases died. In two of them there was

no increase of leucocytes, while the third had the highest count of the series—25,000. The next highest—20,600—was in a case that recovered, but which had marked edema. The average count was 13,900. Eleven differential counts showed an average of polynuclears, 77.6 per cent; large lymphocytes, 17.7 per cent; small lymphocytes, 5.3 per cent; eosinophiles, 3 per cent. Blood cultures were negative in all that recovered, while all that died had bacilli in every organ.

Second attacks have been recorded, indicating that no immunity is conferred. On the other hand, the Bradford investigating board in 1910 [18] noted that of 13 internal cases 6 had worked less than 6 months at the trade, and the board believed that an immunity is acquired in time, probably through light infections that are not recognized.

Prognosis.—The prognosis is affected by the location of the lesion, the most dangerous sites being the upper eyelid and neck, the latter because of its proximity to the larynx and mediastinum. Active reaction with much inflammation around the lesion is usually a favorable sign, but redness may be absent and the patient recover, or it may be considerable and the patient die. A high temperature is more favorable than a subnormal one. The pulse is a good guide, a small, feeble, and rapid one being very unfavorable. Cultivation of the bacilli from the blood is the best guide; the prognosis being grave when they are present and absolutely unfavorable if present in large numbers. Becker has recently stated that he knows of only three cases in the literature and two in his own practice where bacteria were found and recovery ensued. In the fatal cases death ensues, as a rule, between the third and seventh days. The mortality of cutaneous anthrax is about 25 per cent. In Great Britain between 1899 and 1905 there were 320 reported cases, with a mortality of 26.6 per cent. Proper early treatment lowers the mortality.

Treatment.—Excision of the lesion, followed by cauterization, has been the most approved treatment for many years. But in 1909 Herley [20] reported a fatal case in which the edema increased extensively immediately after excision, and in 1905 Legge stated that in 10 of 64 cases treated in London hospitals the edema increased after excision, and in some of the fatal cases generalization of the disease followed excision so quickly as to make it highly probable that they were connected. Cauterization without excision is probably the best local treatment. Some also inject 5 per cent phenol solution subcutaneously in a ring around the lesion. Becker [19], in Germany, advocates mild measures; bed rest, alcohol dressing locally and heart stimulants; 43 of 44 cases without bacteria in the blood recovered under this treatment, while of 11 positive bacteriologically all died.

Sclavo's serum has been in use in Europe since 1897. It is a combined active and passive immunizing serum, though its exact mode

of action is disputed. When used it has seemed to lower the mortality and shorten the duration of the disease. It is injected either subcutaneously or intravenously, and has been used in doses as high as 80 c. c.

Salvarsan has been experimented with by Bettmann and Laubenheimer [21], of Heidelberg. They used it in two cases in man, with prompt recovery, and then experimented with guinea pigs and mice, in which it is always fatal. Treated not later than 20 minutes after inoculation, all survived except one, that died 22 days later. Some were saved when treated even six hours after inoculation, and when given later than that it delayed death.

The features of particular interest in the following case are the unusual mode of infection and the long time that elapsed between the appearance of the primary lesion and of the general symptoms.

Case.—J. S., C. P., United States Navy, 19 years of age, of Polish descent, and a native of Pennsylvania. Family and previous medical history have no bearing. Patient started to work in a coal mine when 14 years of age; three years later he went to Dallas, Tex., and worked on a cattle ranch for over a year, until he enlisted in the Navy, on November 2, 1911. He came out to the Asiatic station in March, 1912, and was detailed to the U. S. S. *Saratoga*. At that time he was a member of the deck force. On July 1 he was detailed as a messman, whose duties are to bring the food to the mess tables and to wash the dishes afterwards. One of his occasional duties was to carry uncovered quarters of beef from the cold storage up to the galley, which duty he performed wearing a sleeveless undershirt and with the meat in close contact with his bare arms. He handled beef and pork in this way. Some of it was United States beef, but most of it was purchased in Shanghai. The last time he did this work was on July 10, 1912. On the 12th he had his rate changed to coal passer and went to work in the fireroom. He had nothing further to do with the handling of meat or with the galley. He did not care much for shore liberty, and was not off the ship from the midde of June until he was sent to the hospital, on August 4.

On the 14th of July, four days after handling the meat for the last time, he first noticed a small red papule on the skin over his right biceps. He thought it was a mosquito bite, but there was no itching and no pain. Three days later his whole arm started to swell, but he noticed no redness nor pain and continued his work in the fireroom without discomfort. At the same time the "pimple," as he called it, commenced to get a little larger. At the end of three weeks after the first appearance of the lesion the whole arm had become much swollen and the sore was about half an inch in diameter. On August 2 he commenced to feel chilly and thought he had fever. The next day he was worse and had to be relieved

from watch about 7 p. m. because of pain in his arm and chilliness and dizziness. During the night the sore on his arm, which he said had become pustular, broke and discharged some yellowish exudate. The next morning, August 4, he reported to the dispensary for the first time after the appearance of the sore, and then only because he wanted his arm bandaged. On reporting there it was found that his temperature was 102° F., and smears from the pustule showed a bacillus resembling the anthrax in appearance. He was immediately transferred to the hospital.

Examination on admission: A man about 5 feet 7 inches tall, weighing 175 pounds, of phlegmatic disposition, and of unusual physical strength. On the skin over the right biceps was a brownish-black eschar about one-half inch in diameter surrounded by a number of small vesicles on an inflamed base. The entire arm, shoulder, axillary and pectoral regions were very red and swollen and firm to the touch, and the axillary glands palpable and tender. The patient complained of some pain in the arm but of no other symptoms. His temperature was 103° F., pulse 102. Smears made from the lesion showed an organism morphologically resembling the anthrax bacillus. Cultures were made and guinea pigs inoculated. The patient was isolated and the lesion thoroughly cauterized and a bichloride dressing applied locally. The next day the temperature had fallen to 101° F. and the cellulitis was less extensive. On the third day the temperature fell to normal. The urine and feces were negative, the leucocyte count 7,000. By the fifth day all cellulitis had disappeared and the patient was well except for the eschar due to cauterization. Leucocyte counts were made daily for about two weeks and were always within the normal limit. The several differential counts made also showed no variation from the normal.

Laboratory Report.[1]—Smears made from the lesion on the arm a few hours after admission and stained by Gram's method showed several types of bacteria, principally cocci and a large bacillus, 1.5 by 5 μ, which retained the primary stain in Gram's method. A series of agar tubes was inoculated from the lesion, and after 24 hours at 37° C. showed a mixed growth of cocci and an organism, the colony of which had the general appearance of that of the anthrax bacillus. One of these colonies was suspended in bouillon and the suspension plated upon a series of plain agar plates. After 24 hours the plates showed numerous white spreading colonies which were similar in appearance to the typical anthrax colony, the surface having an appearance somewhat suggesting the elevations and depressions of a finger print, the periphery that of crinkled strands of hair extending out from the main colony. One of these typical colonies was trans-

[1] For the report on the laboratory findings I am indebted to Surg. C. S. Butler, United States Navy.

ferred to an agar slant and subsequently to several media for identification. From the same agar tube two guinea pigs were inoculated beneath the skin of the abdomen.

The organism in culture gave the following growth characteristics: *Bouillon:* Reaction+1, growth mostly at the surface. There was no diffuse clouding, the appearance being that of a bit of cotton immersed in the medium. This eventually dropped to the bottom, and the bouillon above remained clear. A hanging drop of this bouillon showed strands of a nonmotile rod. *Plain agar:* A thick white growth with a tough surface, eventually the margins taking on a slightly brownish tinge. After two days smears from this showed the presence in most of the rods of a spore which was placed toward the center of the rod. *Potato:* A heavy white growth which also showed the presence of spores. *Blood serum:* A heavy white feltlike growth which eventually liquefied.

Guinea-pig inoculations.—Two animals were inoculated subcutaneously; one lived 36 hours, the other about 42 hours. Neither showed any evidence of being sick until shortly before death. Autopsy showed considerable gelatinous edema around the area of inoculation; the blood was dark, and there were several minute hemorrhages in the edematous area. Smears from the exudate showed the presence of a large Gram-positive rod. Cultures from the heart's blood of both animals gave the anthrax bacillus in pure culture. Smears from the heart's blood showed the organism in considerable numbers and having a fairly thick capsule. Smears from spleen, kidney, and liver gave the same appearance. Sections of tissues of these two animals showed the presence in all the organs sectioned of a large square-ended Gram-positive bacillus. It was demonstrated in the kidney, liver, heart, and spleen. The kidney showed cloudy swelling and the characteristic massing of the organisms in the glomeruli; the liver showed them chiefly in the portal canals, and the heart contained them in the blood vessels and in the ventricular clots. The cause of death was therefore a septicemia and the causative organism the anthrax bacillus.

In this case the infection was apparently acquired by handling raw meat, probably that taken aboard at Shanghai a few days before and kept in cold storage at about $-3°$ C., which temperature of course would have no ill effects upon any anthrax spores that might be present. In reply to an inquiry, Dr. Ransom, the United States public health officer at Shanghai, stated that they hold "with relation to hides shipped from here to the United States that Shanghai and environs, as well as the river ports from which much of the meat supply comes, are infected with anthrax, and in support of this contention the American consul general at Hankow sometime since presented a report from Dr. Thompson, the health officer at Hankow,

showing the disease to be present both in animals and in Chinese handling them." The only precaution taken in Shanghai is the inspection of meat slaughtered at the two municipal abattoirs, through which all the meat exposed for sale in the city must pass. The patient had not been ashore during the possible incubation period and was exposed to no other source of contagion. The ship lay at Woosung, and there were very few flies on board.

The apparently long period elapsing between the appearance of the local and the general symptoms is probably due to the mild infection. Some general symptoms were undoubtedly present for some time before the patient reported sick, as he was one of the type that would avoid going to the dispensary until it was absolutely necessary. As it was, he said that he went to get a dressing on the open sore and not because he thought he was too sick to work.

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ESSENCE OF ORANGE-ETHER ANESTHESIA.

By C. M. OMAN, surgeon, United States Navy.

As the writer has received numerous inquiries concerning a "new" form of anesthetic, demonstrated at the United States Naval Hospital, Brooklyn, N. Y., in a series of five operations and which the press enlarged upon to a certain degree, it is deemed advisable to give a brief statement of the actual facts.

On discussing anesthetics generally with Dr. James T. Gwathmey, one of New York's foremost anesthetists, mention was made

of "the essence of orange-ether method," and Dr. Gwathmey kindly offered to demonstrate the administration.

On the morning of September 9, 1912, this method of anesthesia was used on four patients. Five operations were performed for the following conditions, namely, one double inguinal hernia, one appendicitis, one varicocele, and one for hemorrhoids. As is seen, these are ordinary surgical conditions met with every day and which any medical officer in the service is likely to be called upon to relieve by operative interference. All patients were of the typical Navy type, of a good robust physique, and were not total abstainers. The anesthetic was administered by Dr. Gwathmey personally and by the vapor method, using an apparatus invented by himself. The main features of the apparatus are a cluster of three bottles, a large rubber bag, an inhaler, and a foot pump. It is very compact and can be easily carried in a small grip. The bottles are provided with stop cocks in order to easily and readily regulate the amount of the anesthetic. In one bottle is placed a couple of ounces of essence of orange peel and 4 ounces of warm water, the second bottle contains ether, and the third may be used for chloroform.

Each patient was given a preliminary hypodermic injection of one-eighth of a grain of morphia 1 hour before the beginning of the anesthetic and one-eighth of a grain of morphia and one one-hundred-and-fiftieth of a grain of atropine hypodermically one-half hour before. They were not allowed to walk to the operating room, but were carried in and placed on the table. The time actually consumed for the anesthetic for the five operations was 1 hour and 58 minutes; that is, counting the time from the beginning of the anesthetic to its withdrawal. The patients were not disturbed in any way until completely relaxed, and then the preparation of the field of operation was begun. The amount of ether used was 7⅝ ounces. The average time to get the patients completely under was 6½ minutes.

The anesthetic is begun by administering nothing but vaporized essence of orange, the patient gradually becoming accustomed to this agreeable odor. Then a very small amount of ether vapor is begun, and with experience this can be limited to such an amount as to keep it masked by the essence of orange odor until the patient is completely anesthetized, when the essence of orange is diminshed.

In all these cases anesthesia was obtained with practically an absence of the usual unpleasant phenomena and sequelæ. No restraint of the patients was necessary. Absolute relaxation was present. The ears showed a slight duskiness in two of the patients, but the blood in the field of operation was always of a very good color. Recovery followed hard upon the completion of each operation and the patients presented a perfectly normal appearance. On being questioned they stated that they remembered nothing except a pleas-

ant sensation of the agreeable odor of orange. One vomited a short time after he was removed from the operating room, but generally speaking the usual disagreeable aftereffects of a general anesthetic were absent.

Dr. Gwathmey in company with Dr. W. C. Woolsey, of Brooklyn has been experimenting with perfumes in conjunction with the administration of anesthetics for some time. Dr. Gwathmey noticed that in the administration of anesthetics to children a preliminary dropping of a few drops of the mother's favorite cologne on the mask served to place the child's mind at rest. Various essential oils such as oil of bergamot or terpineol were originally used, but it has been recently discovered that the odor of essence of orange has ten times the penetrating odor of that of ether vapor; in fact, 0.00005 mg. being sufficient perceptibly to affect one liter of air. Experiments on guinea pigs were used to dispel the illusion that it had some anesthetic value of its own. These animals exhibited a philosophic calm that might be construed to have been an expression of enjoyment.

The general opinion is that the essence of orange has absolutely no anesthetic value in so far that it has any influence on the central or peripheal nerve system. However, it may be that a certain obtunding of the olfactory nerves does occur. The main result of the pleasant odor seems to be psychic. Surely, if the sickening odor of ether or chloroform can be lost in a sweet sensation a great gain will have been made in diminishing the dread of surgical ordeals, as it is well known that the fear of the operation is not usually uppermost in the patient's mind but it is the dread of the anesthetic, and as one surgeon aptly expressed it " any one of many surgeons may do the operation, but who will give the anesthetic? "

Of course, it is believed that a great deal of the success of the demonstration was due to the scientific and masterly manner with which Dr. Gwathmey administered the anesthetic. However, the technique of the administration can be acquired very readily and with less danger to the patient than any other anesthetizing method. The hospital steward who administers many of the anesthetics for us at this hospital readily acquired the method after a few demonstrations.

I have used this three-bottle vapor inhaler recently in private cases with uniform favorable results. The patients were agreeably surprised at the freedom from the ill aftereffects and they were positive in their assertions that they and their friends would never use any other method of taking anesthetics. In fact, in some cases where we used the " drop method " of producing anesthesia we have dropped a few drops of the essence of orange peel on the mask preliminary to administering the ether and the patients claim that they never knew they got any ether.

Dr. Gwathmey's apparatus, namely, the three-bottle inhaler, can be purchased of almost any instrument maker for about $25. It is very compact and would be a great addition to the Medical Department of the Navy.

The closed, vaporized method of giving anesthetic is gradually doing away with the old "open" or "drop" method and has the advantage of diminishing or abolishing the usual unpleasant after-effects, in doing away with the excitement usually present in the beginning of the anesthesia, and of diminishing the amount of anesthetic used and thereby saving vital organs, particularly the kidneys, heart, and lungs, not mentioning the monetary value.

The essence of orange peel seems to differ in its efficiency depending upon whether it is bitter or sweet peel, that of the bitter peel being the more valuable.

IODINE STERILIZATION AS NOW USED AT THE UNITED STATES NAVAL HOSPITAL, NORFOLK, VA.

By W. M. Garton, surgeon, United States Navy.

Various forms of iodine have been employed in surgery for years, and its value as a disinfectant of the skin is only appreciated by those who have used it repeatedly. Grossick, in Germany, and Senn, in this country, were the early advocates of its use, both for skin disinfection and the sterilization of catgut.

Iodine is particularly valuable in two classes of cases: Emergency wounds, especially of the soiled extremities of the laboring class, where the removal of grease and dirt is out of the question, and in sterilization of the skin prior to operations. In emergency cases the following procedure will give the most gratifying results: (1) Stop all hemorrhage; (2) mop off with dry gauze; (3) immerse in 7 per cent (the official) tincture of iodine; (4) sew up if necessary; (5) bandage in dry gauze; (6) keep water of all forms away.

The routine method of skin disinfection and sterilization has been in use at the naval hospital, Norfolk, Va., for the past two and one-half years. I am thoroughly convinced, as are all the staff, that it is the ideal method adaptable to all kinds of cases with perfect sterilization of the skin.

Not only is it ideal, but, as above mentioned, its great usefulness in accidents is extremely valuable. It is simple, and saves time, labor, and cost of dressings prior to operations. It does away with the anteoperative procedures, which are not only annoying to the patient, but mentally disturbs, and in some cases frightens them. The skin inflammation from perhaps too vigorous scrubbing or bichloride irritation is avoided.

I have talked with many surgeons, and most of them were not using iodine, owing to the fact that skin blistering or a dermatitis followed. This can be avoided by washing off the excess with pure alcohol after the wound is closed.

I will describe the method in use at the Norfolk naval hospital, perhaps going too much into detail: A bath may be given a full 36 hours before operation. Shaving may be carried out if the patient is hairy. Sometimes we practice shaving and other times do not. In either case the results are the same. Shaving should be done dry, using alcohol (no water) 12 hours before operation. The usual precautions in regard to the bowels are followed. Nothing more is now necessary until the patient is placed on the operating table, his knees secured, field of operation bared, and the nitrous oxide-oxygen anesthetic started. (Note carefully the patient is on the operating table, not roller stretcher, and the anesthetic started, and no further transfer required, hence no danger of infection by handling or misplaced sheets or dressings.)

A sterile medicine glass containing official tincture of iodine with a sterile cotton swab is passed to the assistant, who thoroughly applies one coat not only over the field of operation but to the surrounding area. Always use fresh tincture and a new swab with each operative case. The time is now taken, and full five minutes are allowed to pass, while assistants, nurses, etc., keep hands off and stand around. At the end of this time the sterile sheets, towels, etc., are applied, covering over the skin not required for the operation. The skin by this time is dry, has a nice bronze color, and the odor of iodine is most perceptible. When the intestines are to be exposed a dry protective gauze pad is made to cover the skin.

After the wound is closed another light application is applied to the incision, a dry gauze pad is used to cover the wound, while all draperies are removed and the excess of iodine removed with gauze saturated in pure alcohol. This prevents the dermatitis and blistering so often complained of in the iodine method.

The usual dry gauze dressing is then applied, held securely in place with zinc oxide adhesive straps. Six to eight days later the dressings are removed, the wound is absolutely dry, and no signs of infection exist. A light application is again applied, principally over the stitch wounds; then the silkworm gut sutures are removed and another light coat of iodine applied and a dry gauze dressing added. The results have been uniformly successful in all classes of cases, and, if carried out as described above, infection in clean cases will be almost unknown.

The two factors that are absolutely essential in iodine skin sterilization are: Wait full 5 minutes after application and allow no water to touch the skin 36 hours before operation. If this latter has taken

place or if the patient sweats, an application of pure alcohol is recommended. We are all prone to quote statistics from which we can prove our case, but I will only say that in 1,180 of all kinds and classes of clean cases last year and an equal number this year we have yet to have an infected case.

In closing, just a word regarding the preparation of catgut. Always buy the yellow or dirty looking catgut, and test it to see that it is not brittle. Wind on glass spool and secure both ends. Immerse in 5 per cent alcoholic solution of iodine for five days. At the end of this time it is ready for use. Place spool on dry sterile towel and allow iodine to evaporate. If brittle, it can be immersed in sterile salt solution, or if iodine is to be removed, place in alcohol. After drying it can be placed in sterile jars for future use.

From the above it will be seen that its preparation is inexpensive, it is not easy to infect, and its tensile strength is not in any way impaired.

HYGIENE OF THE PERSONNEL BELOW DECKS.

By B. F. Jenness, passed assistant surgeon, United States Navy.

That much could be done to improve the physical condition of that portion of the ship's complement employed below decks is a fact evident only to those who may pause to consider in detail the life of such men and to note their stamina as compared with that of their shipmates on deck.

The consideration of the health of these men in this article necessitates a division into two classes: The fireroom force and the artificer branch, for while both classes spend their working hours below decks, the duties, habits, and privileges of each differ to a degree requiring separate discussion and recommendation.

There are, however, certain hygienic or rather unhygienic facts in the lives of each class of men which are common to both, and therefore space may well be given to generalities. It is not the physique of the men below decks that needs attention, for in most cases that is chosen in the recruiting office. Firemen and coal passers, for example, are required to be muscular, and muscular development increases rather than decreases with the work of those below, particularly the fireroom force. Muscular development, however, while not destructive to the general health will not in itself promote it. These men spend the greater part of 24 hours in artificially lighted, overheated compartments, for as a rule it will be found that firemen, coal passers, water tenders, electricians, etc., when off duty loiter in groups in the washroom, about the engine-room hatches, in store or dynamo rooms, or about the berth deck sleeping or reading. The majority are too

much exhausted to go on deck or consider it too much bother to clean up and shift into uniform to make an airing worth while.

The usual liberty hour is 5 o'clock, and those going ashore reach the outer world in season to greet the setting sun; and they must be back aboard ship before the sun has cleared the horizon in the morning. Such is the routine of the average sailor employed below decks. Under such conditions muscular development is of as much avail to the fireman as it would be to a Marathon runner who had never been outside a gymnasium, and the resistance against disease in one case would compare favorably with that in the other. It is the resistance of these men that is below par, and still going down, for with the building of the "dreadnaughts" come greater details of work and the call for more men below decks to keep up the efficiency of each department.

The men in question include all classes of "workers below decks" from coal passers to berth-deck cooks, and the grand total of this great force of enlisted men who seldom spend an hour in the bright sunlight stands for a high percentage of the total naval personnel.

The setting-up drill is an excellent beginning for the day's work at sea, and the deck force exhilarated by the exercise in the open air go about their work refreshed. Their work is, however, in the same invigorating atmosphere in which they took the drill on deck, and the effects of the 10 minutes' setting-up are a mere respiratory stimulant compared to the vigorous exercise of the day's work.

In the case of the "below-deck" hand the stimulating effects of the drill must last him well-nigh the entire day, refresh him for his work in fireroom, storeroom, galley, dynamo room, or double bottoms, as the case may be, and furnish him with the benefit of outdoor air while he congregates in warm, comfortable nooks when off watch. This he does in preference to going on the main deck; and this bad habit is not corrected. These men are not wanted—in fact, not allowed on deck with begrimed faces and dressed in untidy dungarees or whites; and therefore, through weariness, indolence, and freedom of habit on one hand, and an exacting military discipline on the other, they are prevented from maintaining a standard of health commensurate with their duties.

A pertinent question at this point would be: What manifestations have these men of lowered vitality and lessened resistance? In general, the men who work below decks are anemic; they suffer from intestinal disturbances and constipation. They are more susceptible to infections than those on deck. A generous percentage of the tuberculosis among enlisted men is found among the engineer's divi-

sion. Acne and other skin irregularities are more common among the below-deck force.

On a battleship in the North Atlantic Fleet the writer noticed not long ago that tonsilitis, minor infections from abrasions and wounds, and abscesses were prevalent among those who were employed below decks. Tabulations from the medical journal were therefore made for the period between April 1 and August 9, 1912, for the purpose of ascertaining definitely whether or not the seemingly large percentage of invalidism among the engineer's division and artificer branch was a fact. The diseases taken were tonsilitis, abscess, and infected wounds, and the results were as follows:

	Engineers and artificers.	Deck force.
Tonsilitis	48	17
Abscess	71	42
Infected wounds	11	8
Total	130	67

These figures, though not covering a period sufficiently long for reliable statistics, bear out, on one ship at least, the belief based at first on observation only of those who came to the sick bay for treatment. The writer has further observed this class of men in hospital wards, in the recruiting office, where many appear for reenlistment, and on many other ships in the Navy, and although possibly influenced by the fact that he has been searching for debility in these men he has endeavored to view them fairly and is convinced that the present daily life and duties of the men below decks has lowered, and is lowering, their power of resistance against disease.

The remedy for this condition has many phases. There is room for improvement in the below-deck surroundings of these men. Slight changes in construction are necessary. The habits of the men should be changed. Their privileges should be modified and the military discipline surrounding them should be directed along new lines. Compartments below decks are frequently overheated and underlighted. The eyesight of men below decks is notably deficient. Men spend hours in small compartments studying and reading and playing games. They work, rest, and sleep in these compartments unmolested except to report at quarters. If a storeroom keeper is seen about decks he may be asked to give his reason for being absent from his station. The jack-of-the-dust "hangs out," as the expression goes, in the issuing room, the storeroom keepers in the storerooms, the gunner's mates in the turrets and handling rooms, the electricians in the dynamo room, the carpenter's mates about their

benches, the painters in the paint locker, the cooks in the galley, and the stewards in the mess storerooms—and they are always to be found at their respective "hanging-out places." They are domestic in their habits, they seldom visit, almost never walk on deck. Two calls arouse them, "Quarters" and "Liberty party lay aft." Is it not a natural result that these men have a lessened resistance to disease?

Our newest "dreadnaughts" have many sanitary improvements in construction not found on the older type of ships, but it should be remembered that the majority of enlisted men are serving on the older type of ships, and the health and comfort of men on them are as important as the health and comfort of men on the modern ships. It is to the older vessels then that we must turn our attention hygienically, and certain points in the construction, fittings, and customs on these ships deserve attention. The wash rooms for the engineer's force on many of the ships are inadequate in size and the washbowls are too small and of old style. Shower baths should be installed and a generous supply of water allowed. The wash-room deck is in many cases a reservoir for wash-water drainage. The deck angle is not great enough for prompt drainage and water collects in the corners. The locker doors should not be allowed to be covered with painted canvas. The lockers should be larger and no two should be contiguous, thus allowing ventilation on all sides of each locker except the back.

Storeroom keepers, jacks-of-the-dust, paint-locker men, cooks, and stewards should not be allowed to sleep in compartments in which they are assigned duty. They should have hammock berths on deck with the rest of the crew. Linoleum, rugs, canvas, or other deck covering should not be permitted in any storeroom or compartment below the berth deck. Clothing should not be stowed in compartments and storerooms. The clothing of men on duty below decks should be kept with that of the deck crew.

Men should under no circumstances be permitted to sleep on mats or on hammocks spread on deck; while it is true that the coolest air is just above the deck level here also is the greatest number of bacteria.

Recommendations for improved hygienic conditions on board ship frequently appear in the Annual Report of the Surgeon General. In view of the above discussion the following is quoted from the Surgeon General's Report for 1911, under the head of "Tuberculosis":

> Members of the engineer's force should be allowed to go on deck in clean dungarees and should be encouraged to do so. Loafing and sleeping in the wing passages should not be allowed; they should be kept clear of lockers and other impedimenta. Wash rooms should be better ventilated. The deck should have a greater drainage angle and a sanitary type of washbasin should be installed. Wash rooms and locker rooms for the engineer's force should be separate.

It is frequently observed that at "all hands aft," "abandon ship," and other drills the men from the firerooms and bunkers, also other stations below decks are called hurriedly to the main deck clothed only in working uniform and usually perspiring freely. They stand in ranks until "secure" is sounded. Tonsillitis, bronchitis, and colds result from such exposure, and each attack lowers the vitality of the individual.

Since our acceptance of the theory that heat exhaustion in the fireroom is due to the high specific gravity of the blood from rapid loss of its watery elements, we should see that men in the fireroom have an abundant and convenient supply of drinking water. Buckets of water taken below rapidly become heated and unpalatable, and oatmeal water is decidedly unpopular as a beverage below. Each fireroom should be supplied with a bubbling fountain. The loss of fresh water would be considerable, but it is believed that the benefit to the men would compensate for this loss. The mental effect of the sight of cool bubbling water would be to cause men to drink more frequently larger quantities of water than they can be induced to take from buckets.

It is believed that the keynote to improvement in hygienic conditions among the below-deck force lies in changing the routine life of these men. They are, by custom and regulations, in an unhygienic groove which grows deeper as more strenuous duties on new men-of-war require more of their services below decks. The following recommendations are given, in closing, as factors which are considered by the writer as vitally important in raising the standard of health of these men, and in raising that standard better fit them for their strenuous and unhygienic work in the innermost recesses of our "dreadnoughts":

1. That no enlisted man be permitted to sleep below the berth deck, and that they be required to sleep in hammocks swung clear of the deck.

2. That men of the engineer's division and artificer branch be prohibited from loafing on the berth deck and in compartments when off watch.

3. That men employed below decks be permitted by the captain and encouraged by division officers to spend their leisure hours on deck in the open air in suitable weather, and that they be urged to spend their liberty hours in the open air when ashore.

4. That men in the engineer's force be required to spend a certain number of hours on deck in the open air when off watch.

5. That the medical officer instruct the engineer's force in methods of hygienic living.

6. That such athletic appliances as handball, medicine ball, baseball, quoits, rowing machine, and other devices be supplied these men in order to attract them to the main deck and furnish them exercise and amusement while there.

7. That men in the engineer's force be allowed on deck in clean working uniform, and that deck space be allotted them for exercise and amusement.

8. That liberty for the engineer's division and artificers be given during the sunlight hours.

9. That men called on deck when in a heated condition be required to wear sweaters.

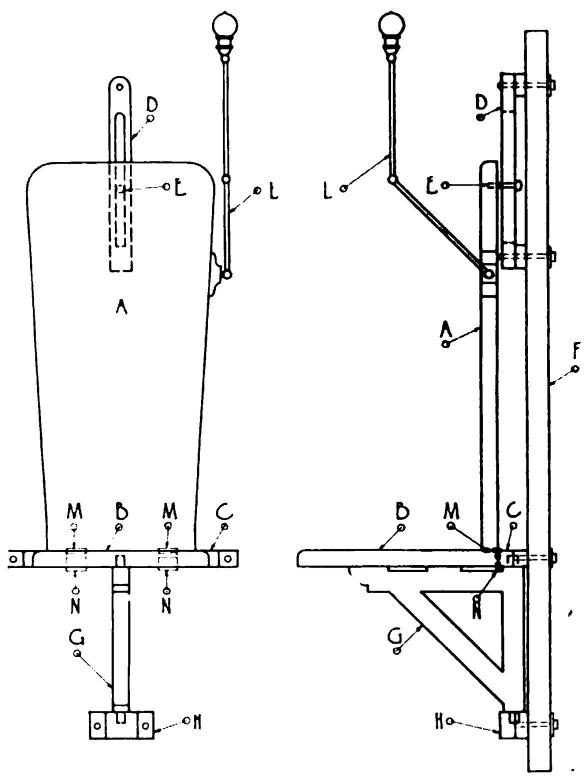
U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to pathological collection, United States Naval Medical School, January-March, 1913.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
928	Liver	Amebic abscess	Dr. W. H. Bell, Colon, Panama.
934	Blood	Vincent's angina	Dr. G. F. Cottle, Great Lakes, Ill.
935	Liver		Dr. W. H. Bell, Colon, Panama.
936	Large gut		Do.
937	Mesenteric gland		Do.
939	Entameba tetragena		Do.
944	Fifth vertebra and spinal cord.		Dr. C. M. George, U. S. S. Glacier.
948	Ulcerative colitis		Dr. E. O. J. Eytinge, naval hospital, Guam.
950	Renal calculus		Dr. F. W. F. Wieber, navy yard, Boston, Mass.
951	Appendices (13)		Dr. A. M. Fauntleroy, U. S. S. Solace.
966	Blood	Double tertian malarial parasites.	Dr. F. H. Stibbens, U. S. S. Annapolis.
972	Liver, lung, spleen	Histoplasmosis	Dr. W. H. Bell, Colon, Panama.
976	Stomach	Carcinoma	Dr. M. A. Stuart, naval hospital, Las Animas, Colo.
977	Splenic flexure of colon		Do.
981	Meckel's diverticulum		Naval hospital, Las Animas, Colo.
983	Larynx	Tuburculous	Do.
985	Mammary gland	Tumor	Dr. A. M. D. McCormick, Naval Academy, Annapolis, Md.

Additions to helminthological collection, United States Naval Medical School, January-March, 1913.

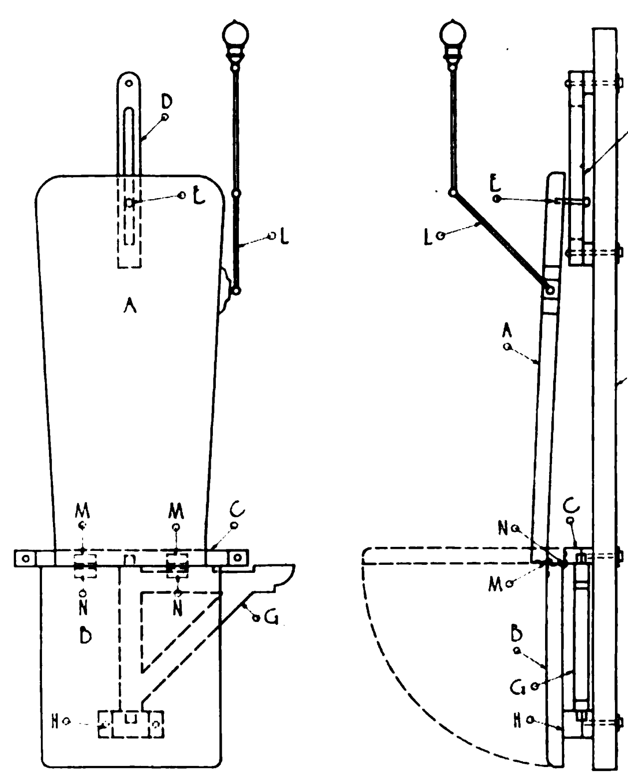
Accession No.	Tissue.	Diagnosis.	Collected by or received from—
19866	Liver of rat	Cysticerci	Dr. J. C. Parham, Tutuila, Samoa.
19873	Carcass of rabbit	Taenia coenurus	Dr. M. A. Stuart, Las Animas, Colo.



·FRONT· ·SIDE·

·CHAIR·READY·FOR·USE·

A BACK OF CHAIR, CONNECTED TO SEAT "B" BY HINGES "M"
B SEAT
M HINGES
N HINGES CONNECTING SEAT "B" TO BACKBOARD "C"
C BACKBOARD MADE FAST TO DOOR "F"



·FRONT· ·SIDE·

·CHAIR·COLLAPSED·

F DOOR
E SLIDING LUG, MADE FAST TO BACK OF CHAIR, WORKS IN SLIDE "D"
D SLIDE MADE FAST TO DOOR "F"
G BRACKET SUPPORT FOR SEAT "B"
L ELECTRIC LIGHT ATTACHMENT

COLLAPSIBLE CHAIR FOR EYE, EAR, NOSE, AND THROAT WORK.

SUGGESTED DEVICES.

A COLLAPSIBLE CHAIR FOR EYE, EAR, NOSE, AND THROAT WORK ON BOARD SHIP.

By A. H. Robnett, passed assistant surgeon, United States Navy.

Having found it very difficult to locate any convenient place on board ship for performing satisfactorily eye, ear, nose, and throat work, largely by reason of lack of space for the chair and proper arrangement of lights, the author has devised the collapsible chair, depicted in the accompanying drawing, herewith briefly described. This chair has been found to be very satisfactory, takes up practically no room when not in use, and furnishes a convenient attachment for an adjustable light.

It consists of a board back A, 15 by 31 inches, slightly curved at the top and mortised at the bottom into a piece of wood 3 by 13½ inches. To the bottom of A and the front edge of another piece, C (2 by 20 inches), bolted to the wall or door F, are attached two pairs of hinges M and N, which in turn are attached to the top and back side of the seat. These permit the seat B to be raised in position for use and to collapse.

B may be made any width to suit, but it has been found that a seat 16 inches long and 14 inches wide suffices. Below this seat is a triangular brace G, which is pivoted at the top and bottom to the pieces fastened against F. When the seat is lifted into position for use this triangular support is brought out at right angles to the wall, and folded back against the wall when the chair is not in use, thus allowing B to fall into a perpendicular position and parallel with the wall. Instead of the above seat a turning stool bottom may be used.

The back A is attached to the wall of door F through the aid of the piece of wood D, which contains a slot in which slides the T-shaped piece of metal E, allowing for the adjustment of the back A and seat B when in use or collapsed.

The light may be attached permanently, or to a movable bracket on either side of the back. The writer has a movable bracket which is attached to a small piece of wood, which in turn slides into a metal bracket on either side.

The ship's carpenter made this device and it is simple and inexpensive. The one the writer has used is attached to the sliding dispensary door and it is found that it takes little more than 3 inches of space when in a collapsed position.

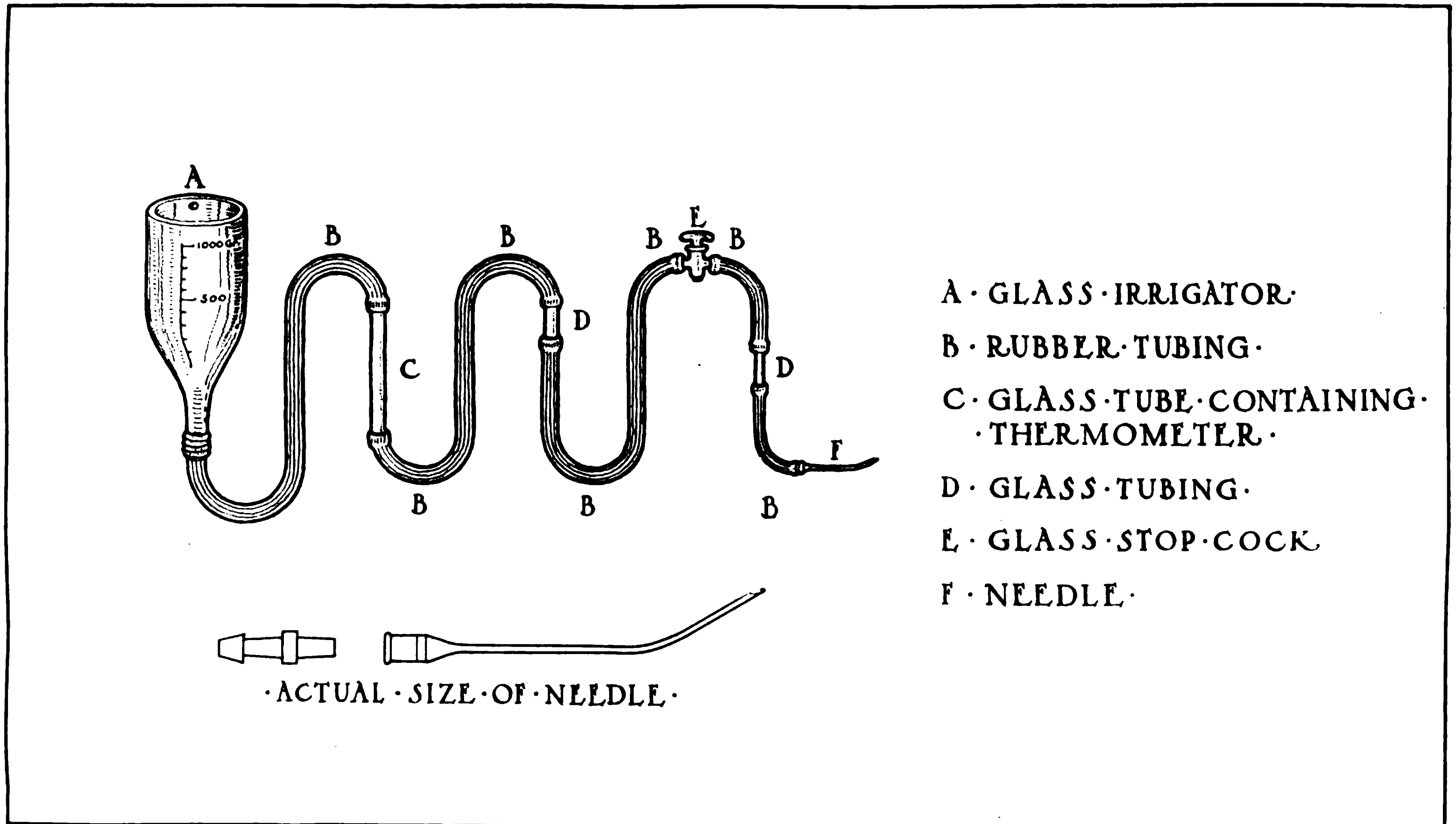
AN APPARATUS FOR INTRAVENOUS MEDICATION.

By N. T. McLean, passed assistant surgeon, United States Navy.

The accompanying illustration shows an apparatus for intravenous medication, especially for salvarsan, which is the outcome of endeavors at the New York naval hospital to simplify and facilitate the speedy and accurate use of this drug. Our experience showed that with the needles formerly in use it was very easy to puncture the vein selected but very difficult to keep the point of the needle in the lumen of the vein for the minutes necessary to allow the salvarsan to enter the circulation. The bent needle shown overcomes this difficulty. The rest of the apparatus was modified from time to time as use suggested. Up to November 1, 1912, about 300 injections had been given with the apparatus with but 6 failures, later proven to be due to faulty technique. The only step requiring any particular skill or training seems to be in the way the vein is punctured—a quick, sharp thrust, with the parts lying normally at rest is requisite, and then strict attention to keep the point of the needle quiet during the flow of the fluid.

Having the sterilized apparatus set up and filled with salt solution of not less than 100° or over 110° temperature—with patient lying on the table, arm and fore arm in a comfortable position on attached side tray—paint site of puncture a mahogany brown with iodine and cover hand and arm with sterile field cloths. A tourniquet (under field cloth) on middle of arm gives best superficial venous engorgement.

Selecting median cephalic or median basilic by preference, carefully palpate engorged veins to ascertain exact position. Insert needle with quick thrust along the long axis, without seizing or otherwise disturbing the engorged vein. (The natural desire to seize and pinch the vein when inserting needle seems to be the cause of most failures.) If vein has been successfully entered venous blood flows very freely from open end of needle. Connect the two portions of needle with salt solution flowing freely from irrigator end and blood flowing freely from point end, releasing tourniquet at same instant. Let 50 c. c. or so of salt solution flow and watch for extravasation. If any occurs stop and make new puncture. If none occurs add the salvarsan solution, letting all flow into the vein, then washing out apparatus with about 50 c. c. of salt solution, being careful during



APPARATUS FOR INTRAVENOUS MEDICATION.

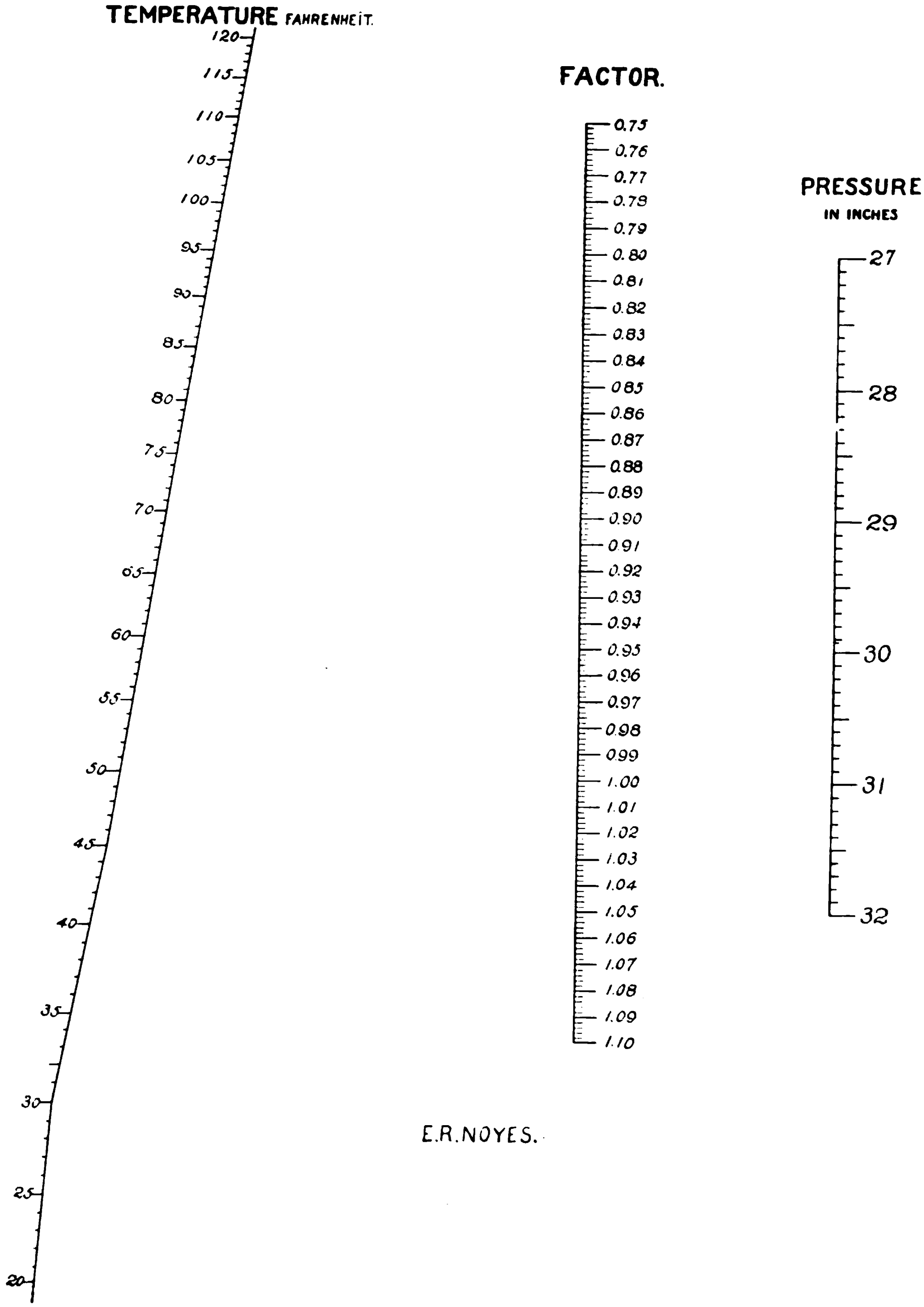


CHART FOR CORRECTION OF GAS VOLUMES.

this process that needle is held perfectly quiet. When entirely washed out, remove needle by quick pull and cover puncture with small patch of gauze retained by collodion.

CHART FOR THE CORRECTION OF GAS VOLUMES.

By E. R. Noyes, chief pharmacist, United States Navy.

The utility of the Farmer chart (a reproduction of which appeared in the Bulletin of October, 1911) as a simple and reasonably accurate means for correcting gas volumes was without doubt quickly apparent to those who have such corrections to make. The objection to the chart is that the centigrade system of temperature and metric system of pressure measurements are used. Since the thermometers and barometers employed in the Navy are in the Fahrenheit and English systems, respectively, it was believed that the construction of a chart based on the latter methods of measurement would prove of some value to the service.

The manner of using this is the same as that for the original Farmer chart; that is, connect with a straight edge the temperature and pressure readings and note the point on the factor line through which the straight edge passes. This point will represent the fraction by which the volume of gas must be multiplied in order to determine what its volume will be at 32° F. and 29.92 inches pressure.

Example: Volume of air sample=4,250 c. c. Temperature, 67° F., and pressure, 28.8 inches. By connecting 67 and 28.8 with the straight edge it is found that the latter passes through the point which would be represented by the fraction 0.899. Then $4,250 \times 0.899 = 3,820.75$, an error of 0.04 per cent.

Absolute accuracy is not claimed for the chart, the error when present being due to faulty draftsmanship. The errors are, however, not sufficient to prevent its use if absolute accuracy is not required.

The chart, as given, is constructed for dry gases.

CLINICAL NOTES.

A CASE OF CHOLECYSTITIS PRESENTING SOME INTERESTING FEATURES AND SOME KNOTTY POINTS IN DIAGNOSIS.

By N. J. Blackwood, surgeon, United States Navy.

J. E. McK., male, aged 37, clerk, was admitted to the hospital at 10 a. m., August 23, 1912, having previously been discharged from the hospital on August 9, after a long and serious attack of typhoid fever, during which he was 91 days in hospital.

He gave the following history of the previous 12 hours: Having been feeling quite well all day and being careful of his diet, some time after his evening meal he began to feel sick at his stomach. At about 11 p. m. he had severe intermittent abdominal pains in the epigastric region, extending somewhat into the right hypochondriac region, these pains increasing in severity until about 2 a. m. of the 23d, when they reached a climax. During all this time vomiting occurred at frequent intervals and a profuse watery diarrhea set in, 12 to 15 liquid stools being passed during the night.

On admission patient was evidently in great pain and was still nauseated and vomited once or twice; temperature, 101.6° F; pulse, 140; respiration, 32. Examination of the abdomen showed no rigidity, but marked tenderness in the epigastrium and right hypochondrium, and extending to a lesser degree as far down as the iliac region on the right side. On careful palpation and percussion the liver seemed slightly enlarged downward, but no mass could be felt anywhere in the abdomen. There was no jaundice present. Blood count showed 23,200 leucocytes, and two hours later this had gone up to 25,600. Urinalysis: Cloudy reddish color, highly acid, sp. gr. 1.030, albumin positive, sugar negative—hyaline and granular casts and cylindroids in considerable numbers and epithelial cells increased above normal.

Many interesting features were here presented for a differential diagnosis. The fact that the patient had just recovered from a severe and protracted attack of typhoid fever and the suddenness of the onset of the present symptoms naturally turned our thoughts to perforation or to involvement of the gall bladder, either from stone or some acute infective condition probably induced by the entrance of the typhoid bacillus. The time of the attack in reference to the beginning of the typhoid was against perforation from that cause,

but the prolonged convalescence and the relapse, the leucocytosis, moderate fever, and high pulse rate, together with the localized tenderness, caused this possibility to receive more than a passing thought. The possibility of appendicitis, with a high adherent appendix, was also entertained. But the gall bladder came in for most consideration, and it was believed that this would be found to be the seat of the trouble, which was apparently of an infective nature, as shown by the high leucocytosis. As a positive diagnosis could not be made from the point of an "externist," and as the patient's condition was evidently becoming progressively worse, operation was decided upon, so as to make the diagnosis from the viewpoint of an "internist."

Patient being etherized at 2.15 p. m., an incision was made through the right rectus extending above and below the level of the umbilicus large enough to allow the introduction of the operator's hand. The peritoneum was found to be normal; the appendix was next examined and found practically normal with the exception of a thin band of adhesion extending from the tip and binding it down posteriorly to the parietal peritoneum and a small constriction about the middle, showing evidence of a previous inflammation. The appendix was removed. The intestines were next carefully examined for possible perforation, but nothing was found. The stomach was normal with the exception of a slight thickening in the region of the pylorus, and the pancreas was apparently normal. The gall bladder was found to be much distended, noncompressible, and its contents could not be emptied through the normal channels, but it contained no stones nor were any stones found in the ducts, although they were palpated throughout their whole length. The wound was now enlarged upward the better to get at the gall bladder, and the liver, examined visually, was seen to be enlarged and of a reddish-brown color. A cholecystostomy was now performed according to the Mayo method, the bladder allowed to drop back into its normal position and not attached to the parietal peritoneum, and the wound closed in layers.

Immediately following the operation temperature and pulse dropped to normal and remained so during convalescence; there was no more pain and patient was perfectly comfortable. Proctoclysis with normal salt solution was given for 24 hours, which is the routine in all abdominal operations. and drainage from the gall bladder established. The amount of bile drained from the bladder in the first nine days was very slight, about 1,000 cc., but at that time the tube was removed and from then on, for five days more, the drainage was profuse, after which the sinus closed rapidly and patient was discharged from the hospital on the 21st day after operation. The bile was examined in the laboratory both micro-

scopically and culturally and reported sterile. The leucocyte count fell to 18,000 the day after operation, and three days later was 8,900.

From a general review of the symptoms and the conditions found I am of opinion that this was a case of subacute cholecystitis, as described by the Mayos in Keen's Surgery, but I am still at a loss to ascribe a cause or to account for the high leucocytosis in view of the sterility of the gall-bladder contents, as in my experience a high leucocytosis is not to be expected without infection.

REPORT OF A CASE OF CHOLERA IN THE U. S. S. "HELENA" AND NOTES ON A SHANGHAI EPIDEMIC.

By W. A. Bloedorn, assistant surgeon, United States Navy.

A. E. D., ensign, U. S. N., complained of a feeling of malaise and general depression about 12 m. August 25. At 6 p. m., as he was feeling weak and slightly nauseated and had had two bowel movements, he was placed in bed; temperature 98° F., pulse 90. At 8 p. m. patient complained of feeling weaker and passed a large watery stool, which presented a typical rice-water appearance; temperature 97° F., pulse 98, weak and thready. Arrangements were immediately made for taking him ashore; a stretcher was placed in the steam launch and patient, surrounded by hot-water bags and blankets, was taken to the landing, where an ambulance conveyed him to the Shanghai Isolation Hospital. On entering hospital patient passed several copious rice-water stools and severe vomiting set in; temperature fell to 96° F. and no radial pulse could be detected; voice became husky and severe cramps of muscles of legs and feet occurred; eyeballs were sunken and nose pinched, and there was extreme cyanosis.

The right median basilic vein at bend of the elbow was dissected out and six pints of hypertonic saline solution was allowed to flow in at a temperature of 112° F., about four hours being allowed for the transfusion. The cannula and rubber tubing were secured to the arm with adhesive plaster and a splint and bandage applied so that patient could not move his arm.

The condition of patient improved very shortly; the cyanosis disappeared and a faint radial pulse could be detected; temperature went up to 99.8° F. and he felt comfortable. This reaction stage lasted about six hours. He then became very restless and uneasy and passed several copious rice-water stools; severe vomiting set in, with cramps in lower extremities; the cyanosis recurred, the skin presenting a dark, mottled appearance and a state of collapse supervened with no detectable pulse.

The left median basilic vein at bend of the elbow was dissected out and six pints more of the hypertonic saline solution allowed to

flow in at about 115° F. The patient reacted well and all the alarming symptoms disappeared shortly, and a little later he passed about 50 c. c. of urine, the first since admission to hospital.

Following this for a day or two patient's condition was critical and stimulants were given at regular intervals; camphorated oil m. xx hypodermically and digalen hypodermically. Extract of pituitary gland was given hypodermically without any noticeable effect on circulation or secretion of urine. For the extreme thirst hot tea and later barley water and rice water were allowed. A diuretic mixture of buchu and potassium citrate was also given.

Patient made a good recovery and was brought back to the ship three weeks following admission to hospital, after two bacteriological examinations of stools showed them to be negative for cholera spirilla.

Shanghai has a foreign population of 14,000, and during the months of August and September there were 23 cases among Europeans admitted to the cholera or choleric diarrhea ward of the isolation hospital. The death rate among the Chinese has gone up to three times the normal rate, and there are no doubt many deaths among them which are not included in this report. The death rate in cases among the European residents was about 45 per cent and among the Chinese in cases admitted to the municipal Chinese isolation hospital about 30 per cent. Most of the deaths among the Europeans were due to kidney complications; in one case no urine was passed from the time the patient was admitted until he died, three days later; others passed into the so-called cholera-typhoid state and died in condition of coma.

It is believed that flies played an important part in spreading the disease among foreigners, the number of cases not being great enough to attribute them to the water supply, and several of the cases had observed the usual sanitary laws concerning the danger of eating uncooked vegetables and fruits. Evidently the only safe procedure, and one which should be carried out in a cholera-infected port, is to have all food served cooked and hot and to drink only distilled water. The practice of serving cold meats and of placing food, which is to be served later, in an ice box, is thought to be dangerous on account of fly infection and also from infection by some article in the ice box, such as uncooked vegetables or fruit.

REPORT OF A CASE OF MEMBRANOUS PERICOLITIS.

By E. L. Woods, passed assistant surgeon, United States Navy.

Lieut. A. M.—In 1905, while serving in the Philippines, he was first troubled with constipation, cramps, and distension. At times the cramps were so severe that he was forced to lie down. He began treatment for constipation at that time and since then he has tried

practically everything, including abdominal massage, without benefit. After taking enemas there would be no result; followed several hours later by colicky pains and a watery evacuation containing very little feces. At the time he came under observation he was thin, his tongue coated, and breath foul. He had a poor appetite, the skin was acneous and muddy, and he suffered from occasional headache.

On May 20 he was given bismuth 3 ounces, acacia 6 ounces, and milk 1 pint at 10.30 p. m. The day following, at 10 a. m., an X-ray examination was made: The bismuth mixture had not reached the descending colon, though a well-defined kink was seen at the hepatic flexure. An enema of bismuth was given and could be seen to be siphoned from the descending colon into the caecum. This enema was passed several hours later.

On May 22 bismuth mixture was given at 5 p. m. and an X-ray made at 10.30 the following morning and a photograph taken. The transverse colon was sharply bent at the hepatic flexure; running down beside the ascending colon to a point below the level of the umbilicus; from there to the splenic flexure, crossing below the umbilicus.

Operation under ether—right rectus incision: The colon was exposed and found adherent to the anterior abdominal wall at the hepatic flexure; the ascending and transverse portions were bound together by dense vascular adhesions and the upper part of the loop formed by these adhesions was covered by Jackson's membrane. The membrane was removed and the adhesions cut between ligatures. As the colon was much dilated the cut edges of the adhesions were covered by running Lembert sutures, which narrowed the lumen, as well as covered the cut edges. The colon then assumed its normal position. A perfectly normal appendix was removed. There was no Lane kink nor were other adhesions present. Following the operation enemas were perfectly successful.

In a letter received from the patient three months after operation he states that his bowels move every day without cathartics of any kind.

REPORT OF A CASE OF CHRONIC URTICARIA SHOWING DERMOGRAPHY.

By George C. Thomas, passed assistant surgeon, United States Navy.

R. S., painter, first class, United States Navy. Previous history: Age, 27$\frac{8}{12}$ years; single. Has had about 6$\frac{4}{12}$ years' previous naval service. Does not use alcohol or tobacco to excess. General health has been good until present attack. No history of any form of lead poisoning. Good family history.

Present illness: There is no evidence that the condition antedated the arrival of the U. S. S. *Rhode Island* in Guantanamo Bay, Cuba, on January 13, 1911. Shortly after this time the man noticed a slight itching, which was not confined to any particular region, and upon scratching or rubbing the skin small wheals appeared in a short time; reached their greatest intensity in from 5 to 10 minutes and gradually disappeared in from one-half to one hour. The disease grew worse, and in a few weeks his condition was such that even a slight pressure or weak blow produced the wheals. He was nervous and did not sleep well. Appetite was fairly good. There has at no time been any sign of lead colic. Change in climate or diet does not seem to influence the condition. The urine contains neither albumin nor sugar and is otherwise apparently normal. An examination of the urine for lead was not made, on account of the limited facilities on board ship. Leucocyte and differential blood counts are normal and punctate basophilia was not discovered. Heart and lungs normal. Station, gait, and reflexes normal.

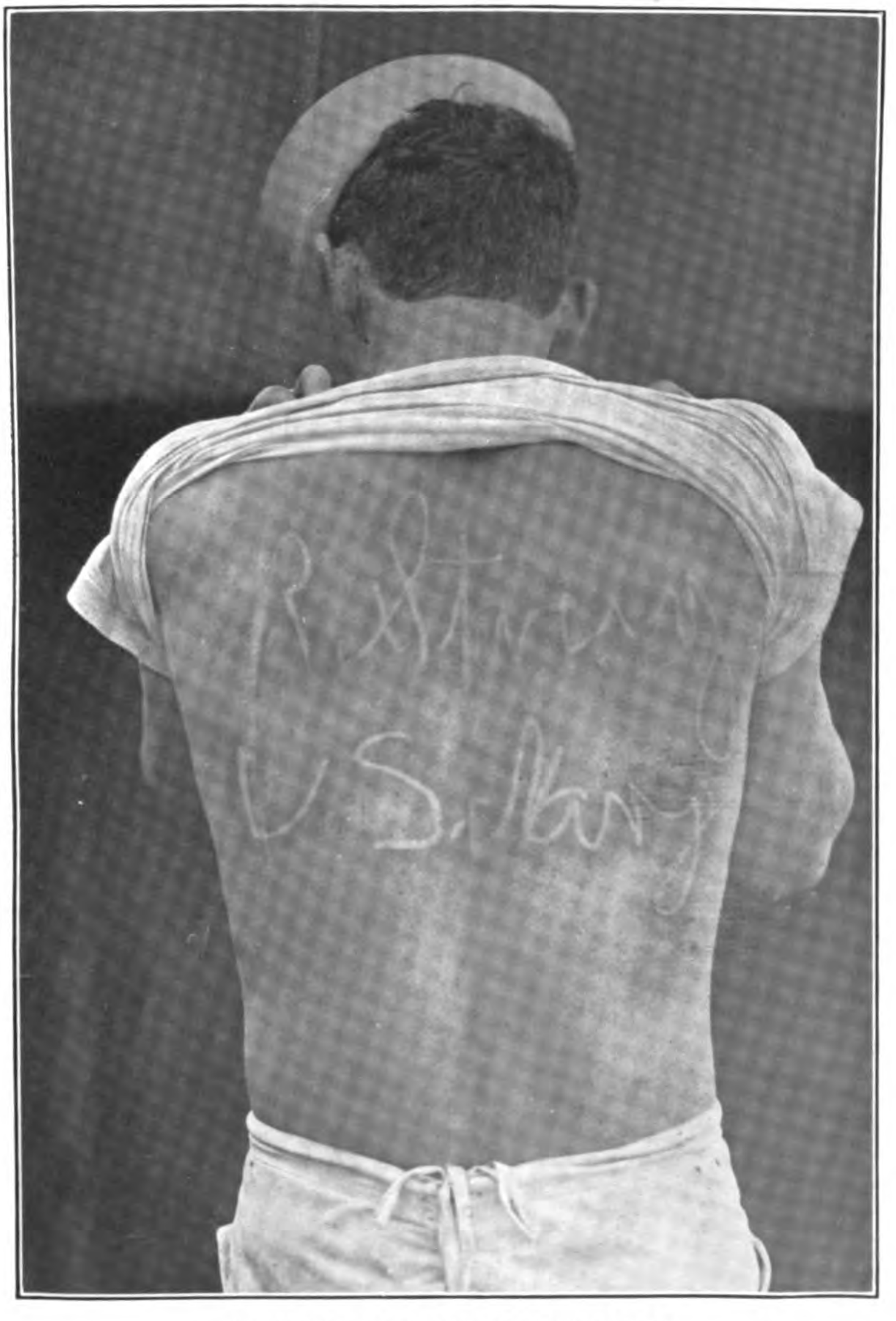
He was relieved from duty as a painter for about two months. Two weeks of this time was spent in the naval hospital in Boston. After the two weeks his condition had not changed, except that his general health had improved slightly. At present (September, 1912) his condition remains about the same. He has not improved under any plan of treatment so far tried. His general health is better than at the beginning of the disease, and he is able to eat and sleep fairly well. When a tracing is made on the skin over any part of the body the distinct whitish, elevated marks will appear in about 10 minutes and last about one hour. The elevation is preceded by redness of the skin, which gradually spreads and surrounds the wheals. The condition at present does not produce very marked itching, but there is a stinging, tingling sensation with a local increase of temperature.

Barthelemy believes dermographism to be due to a toxic vasomotor dermatoneurosis. In the case here reported the condition is probably due to chronic lead poisoning, although there has been no other evident of plumbism and it did not show any improvement when the patient was removed from exposure to lead and treated for lead poisoning.

REPORT OF CASE OF POISONING BY SEA URCHIN.

By W. S. Pugh, passed assistant surgeon, United States Navy.

F. M. C., 2d engineer, U. S. N. A. S., was bathing in the surf at Corodon Island, opposite the town of Corinto, Nicaragua, at about 3 p. m. of January 30, 1913, when he suddenly felt something prick the sole of his left foot, but paid no attention to it, as he thought it



URTICARIA SHOWING DERMOGRAPHY.

was probably a small shell that he had stepped on. A few minutes later—he is sure it was not more than three or four minutes—he noticed that his entire face was swelling and causing his eyelids to close. He was also a little giddy and emerged from the water with difficulty.

The patient states that when he reached the beach his legs appeared to be partially paralyzed, so much so that he could not walk unless supported. Both arms were quite numb from the fingers up, but he was able to move them freely.

I saw the patient about 15 minutes after his accident, and noted the following: His face was a dark red and considerably swollen, particularly about the eyelids. Speech was apparently not much affected, but he seemed to have difficulty in protruding the tongue, which, however, was clear. The patient's pulse was quite irritable and varied between 70 and 120 within a very short space of time. There was apparently a slight anesthesia over the anterior surfaces of the forearms and legs. A partial motor paralysis was noticed in both legs.

Examination of the plantar surface of left foot showed six small punctures, from which delicate sea urchin spines were extracted. This foot was also considerably swollen. Patient was placed at rest in bed and given spts. arom. ammon., 4 c. c., q. 3. h., and a hot 1–1000 bichloride of mercury dressing was applied to the foot constantly.

January 31, 1913, the swelling about the face had practically subsided, nervous symptoms had entirely cleared up. The pulse was still very irregular, ranging between 70 and 95, and left foot was still greatly swollen. February 3, 1913, all symptoms had cleared up and patient was allowed out of bed. February 4, 1913, discharged to duty.

These cases, while uncommon, are of considerable interest and must be looked out for, as these little creatures are quite common on this coast. The spines of the sea urchin penetrate the skin without difficulty, but appear to become very brittle and break up into fine particles on attempt to remove them.

A CASE OF MALARIA TREATED WITH SALVARSAN.

By E. U. Reed, passed assistant surgeon, United States Navy.

I am able to report only one case, but the result was so excellent as to deserve recording.

W. L. C. (seaman), age 20 years, white. Enlisted in New Orleans, La. Previous health excellent; no history of malaria.

While serving on the U. S. S. *Princeton* at Corinto, Nicaragua, he was infected with tertian malaria and had a very severe attack. He required subcutaneous injections of quinine chlorhydrosulphate to

control the symptoms and treatment with quinine sulphate and Fowler's solution in large doses was continued for two months after discharge to duty.

During the trip from San Diego, Cal., to Puget Sound, in June, 1911, he was readmitted with febris tertiana. This attack was less severe, but was a typical relapse. He was on the sick list for five days and again received quinine sulphate and Fowler's solution in large doses for two months after rèturn to duty.

During the trip from Puget Sound to Honolulu, in August, 1911, he again had a relapse and was treated with subcutaneous injections of quinine chlorhydrosulphate. After this attack he was again kept under treatment for two months after return to duty.

On October 8, 1911, at Tutuila, Samoa, he had a severe chill and was again readmitted. Large adult tertian parasites were found in his blood. A cathartic was administered and, on October 9, 1911, 0.6 grm. of salvarsan was injected into one buttock. On the following day and while continued under observation he had no chill or fever. No other treatment was given. Over one year has passed, during which time he experienced the changes of climate incident to a trip to Sydney, Australia, and return, spending over three weeks in Sydney. He has been entirely well during this period, with no evidence of malaria, and several blood examinations have been made with negative results. This case has apparently been completely cured of tertian malaria, after three severe relapses, by one dose of salvarsan.

EDITORIAL COMMENT.

THE PHYSICAL QUALIFICATION OF RECRUITS.

The maintenance of a high physical standard for enlisted men in the naval service is of such vital importance that the following remarks should not be construed as in any sense tending to deprecate an insistence upon the rigid requirements which are in force and which should be maintained.

An examination of the causes for rejection at our various recruiting stations, however, illustrates in an impressive manner the fact that a very large number of applicants are rejected for disqualifying defects which are of such a character as to be appropriately classified as remediable in at least a considerable number of instances. Among such disabilities may be mentioned defective teeth, hemorrhoids, varicocele, flat foot in minor degree, and enlarged tonsils. These four causes were responsible for nearly one-fourth of the 51,000 rejections during the year 1912, varicocele alone resulting in the loss of more than 3,000 candidates. It seems reasonable to suppose that in not a few of these cases minor surgical treatment would have resulted promptly in rendering the applicants capable in all respects of meeting the service requirements. For example, a healthy, robust, and intelligent young man applies at the recruiting station for enlistment and the careful examination of the medical officer fails to detect the slightest physical disability, save varicocele. According to the present rules this valuable acquisition to the service would be lost on account of a disability that might be readily overcome by a slight surgical operation, which would be of not the least danger to the individual.

With the establishment of the Dental Corps, which is rapidly being filled, it is believed that a considerable number of cases heretofore rejected as with defective teeth might be appropriately accepted with a view to immediate treatment after enlistment.

This matter is presented with a view to informing medical officers regarding action along these lines, which is now under consideration, although no definite details have been decided upon as yet. The

principle to be borne in mind is that if such cases are to be accepted they must be selected with great care and with full assurance that they may be rendered fit to meet the present requirements. The danger of jeopardizing the efficiency of the service, which would result from any lowering of the demands which are now enforced, should be fully recognized.

At present it is the custom to accept applicants for enlistment who are not fully trained for their duties in various branches and then to make an effort, subsequent to enlistment, to improve their mental, moral, and professional qualifications, in order that they may be brought up to a certain standard of efficiency. At times when there is difficulty in obtaining men for the expanding services, why should not this principle apply to the physical condition of an applicant and, if a defect exists which is readily remediable, accept him and institute appropriate measures subsequent to his enlistment which will enable him to meet the needs of the service?—(C. F. STOKES, SURGEON GENERAL, UNITED STATES NAVY.)

STATISTICAL REPORT OF THE HEALTH OF THE BRITISH NAVY COVERING THE YEAR 1911.

The returns for the total force for the year 1911 show a continuous improvement in the general health of the fleet as compared with the preceding 5 years. The case, invaliding, and death ratios for the year are again lower than the average ratios for the last 5 years, and the average loss of service for each person compares favorably with both the 5 years' ratio and with that of 1910. The admission rate per 1,000 of force is found to have decreased 26.96 when compared with the average for the past 5 years, while the ratio per 1,000 of men sick daily had decreased 1, and the average loss of service per individual of entire complement has decreased 0.36 when compared with the averages for the same period.

Although it is difficult to accurately compare statistics of one navy with those of another, owing to the lack of exact knowledge of the terms used and the different methods of classification employed, still there are certain points in this report which can be correctly balanced, with interesting results, against the figures given in the annual report of the Surgeon General of the United States Navy covering an identical period. These are given in Tables I and II.

TABLE I.

	Total force.	Total number of cases.	Total invalided from service.	Total of deaths.	Total number of sick days.	Average number of men sick daily.	Average loss of service per man for entire complement in days.
Actual number:							
United States	61,399	37,194	1,373	253	105,063	1,657.98	9.85
England	117,100	76,463	1,867	366	1,157,172	3,170.33	9.88
Ratio per 1,000 of strength:							
United States	....	605.59	22.36	4.12	....	27.00	....
England	....	652.97	15.94	3.12	....	27.07	....

Death rate per thousand.	Disease.	Injury.
United States	2.12	2.00
England	2.22	.09

TABLE II.

Disease and Navy.	Cases.	Invalided from service.	Dead.	Sick days.	Average number of men sick daily.	Ratio per 1,000 of strength.			
						Cases.	Invalided from service.	Dead.	Sick daily.
Alcoholism:									
United States	270	5	3	1,439	3.9	4.39	0.08	0.04	0.06
England	83	1	2	950	2.6	.7	....	.01	.02
Syphilis, gonorrhea, and chancroid:									
United States	10,904	108	2	112,703	308.77	177.59	1.75	.03	5.02
England	13,461	120	1	135,479	371.17	64.00	.49	....	3.16
Tuberculosis:									
United States	350	238	15	12,075	34.5	5.7	3.87	.24	.53
England	286	237	38	25,194	69.02	2.44	2.02	.32	.58
Typhoid:									
United States	258	....	15	14,024	38.42	4.20	....	.24	.62
England	137	....	30	8,462	23.18	1.16	....	.25	.19

The diseases encountered are much the same as those found in the United States Navy, with two marked exceptions: (1) Mediterranean, or Malta fever, still figures in the English Navy, although this year it gives rise to a case ratio of only 0.05 per 1,000, as against 0.5 per 1,000 for the previous five years, while there are no cases in our Navy; (2) dengue in our service caused a case ratio of 13.69 per 1,000, while in the British service but two cases are recorded, resulting in a rate of 0.01 per 1,000.

The close relationship between the ratio per 1,000 of deaths from disease for the two navies is instructive, while the marked difference in deaths from injuries gives opportunity for thoughtful consideration.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

A. W. DUNBAR, surgeon, and J. L. NEILSON, surgeon, United States Navy.

VAUGHAN, VICTOR C., M. D. **The relation of anaphylaxis to immunity and disease.** American Journal of Medical Sciences, February, 1913.

Vaughan states that all cellular metabolism is brought about by the ability of the cells to elaborate ferments capable of splitting up pabulum within their reach; that cellular death occurs when the supply of ferment fails or is of the wrong variety for the pabulum surrounding it.

He cites the fact that the nonpathogenic *B. prodigiosus* contains an intracellular toxin, one part of which produces death when injected into a guinea pig weighing 90,000 times as much as the toxin, and that the pathogenic *B. anthracis* will cause death when one part of its toxin is injected into a guinea pig weighing 1,700 times as much as the toxin. The toxin of the nonpathogenic organism is about 53 times as powerful as that of the pathogenic organism. He explains that this is due to a failure of the growth of *B. prodigiosus* in the human body, owing to the fact that the ferments produced by the bacillus do not digest the animal proteins, or more probably the secretions of the animal cells destroy the bacillus.

In a like manner an organism may be pathogenic for some animals and nonpathogenic for others or the virulence of different strains of the same organism may vary.

The first fundamental fact is that when foreign protein is introduced into an animal certain cells form specific ferment capable of splitting up that protein and no other. The body thus becomes "sensitized" to that protein.

Proteins taken into the alimentary canal are broken up into amino acids, absorbed and reconverted, after absorption, into proteins peculiar to the species.

The second fundamental fact is that every protein contains a poisonous group, designated the primary group or "archon." Attached to the primary group, like side chains in the benzol ring, are secondary or "characteristic" groups in which the sensitizing power of the

protein resides. The primary group is rendered inert by combination with the secondary group, and when free it acts as a poison by disrupting other proteins and combining with their secondary groups.

Anaphylactic shock is brought about by the introduction of a foreign protein, with the resulting formation of a specific enzyme; and the second introduction of the same foreign protein after a sufficient time has elapsed for the development of the enzyme.

Anaphylaxis may be partly averted by heating all therapeutic sera to 56° C.; temporarily suppressed by alcohol or ether narcosis; by heating to 80° and injecting a small portion of the serum to be introduced (very slowly develops); but the best method is the rectal injection of a small amount of unheated serum or, better still, by the subcutaneous injection of a very small dose of unheated serum, 0.1 to 0.2 c. c., and waiting for two hours before giving the dose for therapeutic purposes.

Anaphylactic shock may be feared in all persons having a tendency to asthma or in those who have received previous injections with an interval of 12 days or longer.

Vaughan quotes Von Pirquet in regard to the cause of serum disease. Von Pirquet believes that some of the horse serum remains unchanged until sensitization is sufficiently developed to "bring the effects of the toxic body up to the level of clinical observation." Rosenau has shown that expired air contains a substance capable of causing sensitization. Vaughan suggests that flying hairs from horses might carry protein sufficient to sensitize. Vaughan believes that the value of vaccination against smallpox is due to sensitization of the body in such a manner that when the virus of smallpox enters the body it is at once destroyed. This would also apply to the use of vaccines against typhoid. He states that fever, either acute, fatal, continued, intermittent, or remittent, may be brought about by introduction of foreign protein, the variety depending on the dosage and the frequency of repetition.—(G. F. CLARK, P. A. SURGEON, U. S. NAVY.)

CUSHING, HARVEY, M. D. **Concerning the symptomatic differentiation between disorders of the two lobes of the pituitary body.** American Journal of Medical Sciences, March, 1913.

The advance in our knowledge of the disorders of the ductless glands is largely due to the clinician, and with but two exceptions is limited to those dependent upon a primary hyposecretion of the affected gland, e. g., of the suprarenal in Addison's syndrome, of the parathyroid in tetany, of the pancreas in certain forms of diabetes, of the thyroid in myxœdema, and the changes incident to the deprivation of the ovarian and testicular secretions.

The two exceptions noted above are (1) Graves-Basedow syndrome and (2) Marie's acromegaly, caused by hypersecretion of the thyroid and pituitary glands, respectively.

There is undoubtedly a physiological variation in the activity of the ductless glands, but if the fluctuation is excessive it gives rise to constitutional symptoms and constitutes a malady.

"There exists a characteristic and recognizable syndrome for a primary derangement of each individual gland, whether on the side of its secretory overactivity or of its secretory underactivity."

The derangements of the thyroid gland have heretofore attracted the greatest attention, but now those of the hypophyseal function are coming to the front, and we are able to distinguish clinically between an excess and a deficiency of this secretion.

Furthermore, there is reason to believe that soon a hyperplasia of the adrenals, thymus, and pineal gland may be recognized by the clinician.

As the pituitary gland is a dualistic organ, it follows that clinical expressions of derangement of one or the other portion should be considered.

It is generally conceded that the primary pathologic lesion in acromegaly and gigantism is a hypophyseal hyperplasia.

This view is supported by the striking failure of skeletal growth in preadolescent animals following experimental ablation of the pituitary gland. There also results obesity and underdevelopment of the sexual characteristics. Recent experiments have demonstrated (1) that the strictly epithelial portion of the gland or *pars anterior* is a typical ductless gland; is concerned with skeletal development, (2) the neuro-epithelial *pars posterior* is, in a sense, a gland of external secretion discharging into the cerebrospinal fluid.

A deficiency of this secretion from any cause produces an increase in the systemic tolerance for sugars, tendency to adiposity, subnormal temperature, somnolence, dry skin, polydipsia, alopecia, and psychic changes, while a hypersecretion produces a reverse of the above symptoms.

It is also possible that the *pars posterior* is intimately connected with activation of the generative organs.

From a study of 60 cases of hypophyseal derangement it has seemed not only possible to differentiate between functional disorders of the two lobes but also to diagnose a hyperplasia of one accompanied by a deficiency of the other lobe.

In 3 out of 14 cases of acromegaly observed there were evidences of posterior lobe insufficiency shown by adiposity, high tolerance for sugars, etc., but on the other hand in early stages of acromegaly or in exacerbations there may be a reverse picture, which suggests that there is a hyperplasia of both lobes in the acute stages but that later

there is, particularly in respect to the pars posterior, a tendency toward retrogression.

In Frölich's syndrome (dystrophia adiposogenitalis), it is probable that there is a hypoplasia of both parts, causing deficient skeletal growth (pars anterior), adiposity, low metabolic activity and imperfect sexual development (pars posterior).

Hydrocephalus by causing retention of the secretion of the posterior part may explain the adiposity, subnormal temperature and high sugar tolerance often exhibited. These cases may combine overgrowth with adiposity which may be due to a pressure stimulation of the *pars anterior*.—(A. W. D.)

HAMMAN, L., and SLOANE, M. F. **Induced pneumothorax in the treatment of pulmonary disease.** Johns Hopkins Hospital Bulletin. Vol. XXIV, No. 264, February, 1913.

History.—Rest has long been accepted as an important condition in the recovery of inflamed tissues and its enforcement in tubercular conditions has met with particularly brilliant results, including pulmonary tuberculosis. The frequent beneficial effects of pleural effusion upon tuberculous lesions in the lung have attracted attention, and the relation is often strikingly shown by the decrease of fever, cough, and sputum as the fluid forms only to be followed by recurrence of these symptoms after aspiration, and their subsidence again as the fluid reaccumulates. This beneficial result is ascribed to the immobilization of the lung.

Although pneumothorax in itself is a very benign condition, it is one of the most dreaded of the complications of advancing tuberculosis, due no doubt to associated conditions; e. g., a patient worn out by rapidly advancing disease, great septic absorption resulting from the nearly constant associated pleural infection, or mechanical conditions at the point of rupture, inducing fatally high intrapleural pressure. Occasionally, however, the advent of pneumothorax marks the beginning of improvement in the pulmonary condition, and such an observation led Carson, in 1821, to propose inducing pneumothorax as a therapeutic measure. Adams, in 1887, also suggested this method of treatment, but neither Carson nor Adams put the suggestion into practice.

Forlanini, in 1882, reported a number of striking instances of improvement following the occurrence of spontaneous pneumothorax, and advised its induction in suitable cases. In 1892, he began to practice the method, and in 1894 presented his results before the Eleventh International Medical Congress held in Rome, and in 1895 reported the cure of a case of grave pulmonary tuberculosis, following the prolonged use of nitrogen gas for the maintenance of pulmonary collapse. Although he continued to use this treatment, he published no further reports until 1906.

Brauer in 1906 published his first article upon induced pneumothorax, since which time the literature has been enriched by many notable contributions from his pen. He has done more than any other observer to work out the fundamental mechanical and physiological principles of pneumothorax and has brought valuable clinical and pathological material to bear upon the study of this method of treatment.

In this country Murphy, in 1898, though uninformed of Forlanini's work, was led on by the same considerations to use the method, and the reports of his cases of pulmonary tuberculosis treated by nitrogen inflation of the pleural cavity show striking and immediate benefit, but none at the time of the report had been under observation long enough to allow of conclusions being drawn as to the ultimate result. In the same year Schell reported a case in which a severe hemoptysis was controlled by inducing pneumothorax, and in 1899 Lemke presented a preliminary report of 53 cases treated by this method. Apparently therapeutic pneumothorax was then abandoned in this country, for there are no further reports of its use until 1912 when Lapham, Rothschild and Robinson and Floyd again called attention to the procedure.

Selection of cases.—The application of induced pneumothorax has not been restricted to any particular disease or type of disease, bronchiectasis and chronic nontuberculous infections, as well as tuberculosis of the lungs, having been so treated, but it has been chiefly used in the latter condition. It is evident that one-sided lesions are the most favorable, for it is reasonable to assume that if immobilization is beneficial, exaggerated activity is harmful. However, though both lungs may be affected, the disease is seldom equally active upon the two sides, and experience upholds the conclusion that the opposite lung is not only equal to withstanding the extra work put upon it. but is favorably influenced through diminished toxaemia and the improved general condition of the patient. The tendency has been to establish the value of this method in instances of the disease that have been uninfluenced by the usual hygienic and dietetic measures, and when it is considered that even under these unfavorable circumstances good results have followed the authors feel convinced that the ultimate sphere of its usefulness will be principally in moderately advanced cases. At present it is impossible to represent statistically the results of the treatment, but an estimate of is value may be reached through the study of numerous cases so treated.

The method of inducing pneumothorax.—There are two methods of inducing pneumothorax, that advocated by Brauer and that originally used by Forlanini and which he still employs. Brauer incises, under a local anaesthetic, the skin, fascia, and superficial muscles and fascia of the intercostal muscles, separates the fibers of

the latter down to the parietal pleura, which is then carefully inspected for adhesions. A dull cannula is thrust into the pleural space and gas to the extent of 500–1,000 c. c. allowed to run in. Forlanini without anæsthesia introduces a small-caliber needle through the intercostal space without previous incision, thrusting it carefully forward, ascertaining when the point enters the pleural cavity by manometric readings. At the first operation he introduces only 200–300 c. c. of gas. Murphy used a combination of these two methods, incising only the skin, withdrawing the stilette of the trocar when the rib was reached and turning on the gas and judging that the point was in the pleural cavity by the free flow of gas resulting and by the reading of the manometer. Nitrogen resists absorption from the pleural cavity longer than any other innocuous gas and is therefore generally employed. Air may be used, but subsequent refillings must be made more frequently. Brauer's method has the great advantage of safety, but is a formidable procedure to repeat five or six times. Forlanini's is simpler, causes little pain, and may be easily repeated many times, as is not infrequently necessary where adhesions are present. The authors believe that with proper care the puncture method is quite safe, for in their hands it has given entire satisfaction.

The dangers attending induced pneumothorax are two, air embolism and infection. The former is by far the most important and occurs most frequently during secondary inflations and only upon the injection of gas in the absence of satisfactory evidence that the needle is in the pleural cavity. As the same method of refilling is used in both Forlanini's and Brauer's technic, the latter's operative procedure does not remove the risk accompanying the subsequent injections. Infection of the pleura may occur from without or through the lung. Irreproachable surgical technic will prevent the former and careful manipulation of the needle in the pleural cavity, gentleness in the admission of the gas and attention to manometer readings will largely obviate the latter danger.

The method of inducing pneumothorax used by the authors is next fully described, giving minute details of the apparatus employed. The latter, on account of limited space, are omitted, but should be carefully perused, as much of the danger of the procedure is obviated by proper apparatus. The importance of the manometer readings can not be overrated, and a full statement of the part it plays in guiding the operator to success is given in their article.

For the first inflation a blunt needle with rounded edge is used, a needle even less pointed than those usually employed for lumbar puncture. The bore of the needle should measure from 1 to 1.5 mm. in diameter, as smaller needles easily become plugged with blood or bits of tissue and transmit less satisfactorily the variation in pleural pressure. The point for operation having been selected, the skin is infiltrated with a weak solution of cocaine, and with

a small scalpel the skin and subcutaneous tissues are punctured. The needle is introduced and carefully pushed obliquely forward into the interspace. Usually marked resistance is offered by the fascia of the intercostal muscles and the needle finally pierces it with a sudden pop, which is well felt and often heard. One is then sure that the point of the needle lies amongst the fibers of the intercostal muscle, and another cautious advance forces it directly into the pleural space. The operator has the manometer before him, and if the pleura be not adherent, as soon as the point of the needle reaches the pleural space the manometer records a marked negative pressure with wide respiratory variations. The extent of the variation depends upon the force of the respiratory efforts, usually equaling about —8 to —10 cm. water on inspiration, and —3 to —6 cm. on expiration.

When the pleural cavity is free from adhesions the operation invariably goes smoothly. When adhesions are present it is more complicated: (1) Since the characteristic pleural variations in pressure are absent, and therefore one can not tell with certainty when the needle is in the pleural space, and (2) collapse is rendered difficult and, if the adhesions be dense, impossible.

Various methods have been suggested to overcome these obstacles, and the authors discuss fully the observations of Forlanini and Saugman on these points and give their own experiences.

The amount of gas to be introduced at the first inflation depends in a measure upon the condition of the patient, but the writers lean toward the larger amounts used by Brauer, as their experience shows that 500 to 800 c. c. of gas can be introduced without unpleasant symptoms, even if the opposite lung is extensively diseased, and that such amounts produce an appreciable collapse which minimizes danger in the subsequent inflations. If severe pain or dyspnea develop, only a few hundred cubic centimenters should be injected.

If the original inflation has been successful, the subsequent operations may be performed with great ease. X-ray examinations add great precision to physical examinations in indicating the position and extent of the pneumothorax. At first, inflations are made every second or third day, but later, as the pleura loses its capacity for absorption, inflations at two to three week intervals will maintain collapse.

The pathological anatomy of the collapsed lung is fully discussed, the most striking change being the extreme fibrous tissue formation. Only old caseous areas surrounded by fibrous tissue are encountered, no recent tuberculous infiltration being found even when the opposite lung shows evidence of advancing disease. In spite of long collapse the alveolar walls show no tendency to adhere, and as the epithelium remains intact the lung can be reinflated at any time. The right side of the heart hypertrophies, due to interference with pulmonary circulation. "Besides the functional rest that the pneumothorax induces there is, then, a decided tendency to fibrous tissue proliferation."

Clinical symptoms of induced pneumothorax.—The effects of induced pneumothorax upon the clinical symptoms may be divided

into (1) those resulting from the pneumothorax itself (slight dyspnea, pain during the production of the collapse), and (2) the changes it occasions in the preexisting symptoms (rapid diminution of cough and sputum, disappearance of tubercle bacilli, rapid fall in temperature, increase in appetite, and gain in general well-being, the control of hemoptysis).

Since at present the results in individual cases only can be used to fortify the claims made for the method, records of the authors' cases are appended in sufficient detail.

Conclusions.—Of these three are quoted in full:

"1. Induced pneumothorax is a harmless procedure, and the operation, carefully performed, is without danger.

"7. The total collapse of one lung causes surprisingly little inconvenience. Usually there is but slight dyspnea on exertion. Many of the patients with an induced pneumothorax assist actively in the work about the sanatorium.

"9. While induced pneumothorax will never become a routine method for the treatment of pulmonary tuberculosis, still in selected cases it offers a prospect of temporary and permanent relief when the usual methods of treatment have been unsuccessfully tried. Quiescent lesions in one lung, with acute recrudescence in the other, are the most favorable for the treatment. Its use need by no means be limited to strictly unilateral lesions, but when there is advanced disease of both lungs little benefit can be expected. It would seem advisable not to withhold the treatment until the patient is hopelessly advanced, but to apply it judiciously to suitable moderately advanced patients in whom the disease tends to progress in spite of appropriate treatment."—(J. L. N.)

RUSSELL, F. F. **Antityphoid vaccination in children.** Journal American Medical Association, February 1, 1913.

In children the use of the typhoid prophylactic may be considered as necessary or merely desirable, depending to a large extent upon local conditions, but the author feels that it is highly desirable for that large class of young people from 2 to 16 years of age who leave home for summer vacations, schools, and colleges.

A citation from Osler shows that of 1,500 cases of typhoid treated in his wards 15.4 per cent were under 15 years of age, the disease not being infrequent in childhood, and rare in infants. Further, Dr. Russell points out that in the registration area of the United States in 1909 (the last year for which complete mortality statistics are available) a total of 3,366 deaths from typhoid occurred in patients under 20 years of age, which is almost one-third of the total number (10,722) of all deaths from the disease.

The dosage of the prophylactic is based entirely upon body weight, the child receiving that portion of the adult dose which his weight bears to the average adult weight of 150 pounds. If the fraction resulting therefrom prove inconvenient, the higher rather than the lower amount should be given.

The author now has statistics covering the inoculation of 359 children between the ages of 2 and 16 who have been vaccinated by 50 different physicians in various parts of the United States, and in not a single case did harmful effects result. The reaction at the site of inoculation is usually rather less than that for adults. The constitutional symptoms ranged from no reaction at all to those classed as severe, e. g., having temperatures above 103.

Dr. Russell is of the opinion that revaccination in children should be more frequently practiced than in adults, since the children are immunized on a basis of body weight and are continually adding to that by growth.—(J. L. N.)

SURGERY.

R. SPEAR, surgeon, and H. C. CURL, surgeon, United States Navy.

ZUR VERTH, Dr. M., Marine-Oberstabsarzt. **Grundzüge der allgemeinen Seekriegschirurgie (Principles of general naval war surgery).** Münchener Med. Wochenschrift, No. 47, 1912.

A summary of the entire subject, in a very condensed form; hence, the following will have to be more of a translation than a mere abstract, which, moreover, is desirable on account of the great importance of the subject and the eminence of the writer.

The main question, determining all our preparations for the care of the wounded in a naval engagement, is, above all others, the one that seeks an answer as to the probable number and kind of injuries to be expected. The principal weapon of the warship is the great gun; the ram will be rarely used; the torpedo is doubtless to be feared in close quarters; but the number of men injured through torpedoes and mines is small when compared to that of men injured by gunfire. About three-fourths of all the injuries are due to artillery fire; two-thirds of these are caused by broken pieces of projectiles, the other third by objects set in motion by the latter. All such missiles are irregular in shape and have sharp, jagged edges. The remaining fourth of the injuries is traceable to mine explosions and to missiles set in motion by them. In striking contrast, therefore, to the clean, smooth perforations from the small-caliber rifle occurring in campaigns on land the average injury in a naval engagement is one

showing contusion, laceration, and often complete trituration of the parts; added to these is the chemical effect upon such tissues of noxious gases and small particles of unexploded powder.

There is, consequently, little wonder that most of such injuries in the Russo-Japanese War suppurated. (See Suzuki, Braisted, Spear, Treutlein, etc.) Many of the injuries occurring on board during an actual engagement are due not to the enemy's projectiles but to the ship's own maneuvers. Out of 1,682 injuries on the Japanese side, 410 occurred independently of the enemy's guns. Serving the guns and transport of ammunition claims most of these; besides injuries in the strict sense, cases of unconsciousness from noxious gases occur.

The recovery from injuries incurred in ships at sea is rather surprising; out of 100 injured Japanese 12 died immediately (the drowned were not counted in), 6 died later, 7 were permanently invalided, and 75 returned to their stations sooner or later; 57.7 per cent were treated on board, 37.2 per cent elsewhere.

According to estimates made by Suzuki and Pasquale, we may reckon with a loss of 20 per cent in a fight between two equals. In such a fight 4 per cent will probably be mortally wounded, 8 per cent seriously injured, and 8 per cent slightly.

Preparations for the care of the injured during a battle at sea must begin with the construction of the ship. While for the cure and treatment of the sick in times of peace the laws of general hygiene will be allowed to determine the most suitable place in the ship, during a battle it will be the principle of proper protection of the injured, of the surgical material, and of the surgeons themselves against the enemy's projectiles that must prevail. The main dressing station must be under armor, be made easily accessible, and not used as a general passage; it must be ventilated, lighted, supplied with fresh water, and amply furnished with the necessary material and apparatus for dressings and operations; it must have adjoining places for berthing the injured after being dressed.

The entire ship's company is to be trained in first aid. Carriers or bearers are to be trained specially; their number had better depend more upon the location and internal arrangements of the main dressing station than upon the number of the ship's complement; their selection should be made from considerations of fitness for the duty rather than from other considerations.

Arrangements for the protection of the men from injuries during a battle, preventive measures for the quick recovery from wounds, provision for immediate news of the men in the heat of a battle, the care of the sick, and, finally, preparations for the reception of the expected number of injured must occupy the ship's surgeon on the eve of an engagement.

The ready prepared sterilized mull packets in the German Navy are of three sizes: (1) 8 by 12 inches; (2) 6 by 8 inches; (3) 4 by 5½ inches; they are sewed on the ends of bandages of corresponding size.

The chief source of pyogenic germs being man with suppurating wounds and catarrhal affections, the removal of all such men from the ship is indicated; or else all such sores, even the smallest, must be covered up. For the removal from the skin surfaces of pyogenic germs the best means is the warm, fresh-water shower with the free use of soap; hair, beard, finger and toe nails must be kept short. A clean suit of clothes, complete in all its parts, must always be kept on hand; for nonwashable articles the disinfecting qualities of the sun must be kept in mind. Pockets should be kept empty. As clothes protect from burns and scalds, their removal from bodies and extremities is dangerous, even in fire and engine rooms, and the men must be warned about it.

Germs adhering to bulkheads must be flooded off. Steel, ship's paints, especially vitralin and linoleum, possess antiseptic properties enduring for years, hence the general comparative poverty of ships in germs and the primary healing of many serious wounds. This self-disinfection, however, does not make the cleaning of them unnecessary. Transport hammocks should be rendered germ free. The disinfecting power of the sun, disinfecting stations on the coast, chemical disinfection, auxiliary means on board—all should be used. In special cases the wrapping up of the injured in a clean, sterile sheet protects large wounds from contact with transporting gear.

A battle may last for hours, and light refreshments, especially beverages, may become absolutely necessary; water-closets behind armor are a necessity. Men on the sick list, but slightly indisposed, if at all useful, must be sent on deck to take a hand; the seriously sick are removed below armor; so are drugs and dressings. Transport hammocks are distributed, put in convenient places, where also bags containing first-aid packets and bandages must be hung. Every gun's crew must have easy access to tufts of raw cotton for the ears, and also borated cotton for wiping the eyes. The dressing stations must be in order for reception of patients, of classifying and tagging them. For laying out patients hammocks are used.

A prompt removal of the injured from the place of action is a paramount military necessity; every man must be trained to perform this duty, and the military command held responsible for its being carried out, the surgeons being amply occupied at the dressing stations. Transportation proper of the wounded occurs in the intervals of a fight. From torpedo rooms, engine rooms, and places near dressing stations transportation may be effected during an action. Transport passages are determined upon before the action. The transport

hammock, as modified in the German Navy, aided by the inclined canvas slide, has displaced all other means employed for the purpose. For light cases hand transport is used.

Surgeons being few in number, the care of all light cases must be taken off their shoulders; a strict division of the injured into light and serious must occur at the receiving stations—an important point. At the receiving station also every seriously injured man receives a hypodermic of a maximal dose of morphin; the wound is not touched here, and hand disinfection is consequently superfluous. At the main dressing station, where all wounds are treated, everything coming in contact with them must, of course, be sterile.

Of the utmost importance is the wound tag. It is the greatest preventive of confusion and loss of time. Its color separates at once the slightly from the seriously injured; the former remain on board, the latter disembark at the first convenient opportunity after being once more divided into ambulant patients and such as have to be transported in hammocks.

The handling of the injured at the dressing stations during a battle must be supplemented by a correspondingly careful and effective treatment after the engagement, in pursuance of which twofold object the following principles will be followed with advantage:

(1) Every seriously injured man receives a maximal dose of morphin hypodermically at the receiving station; (2) the margins of the wound may be painted with a 5 to 10 per cent solution of tincture of iodine (not necessary); (3) cover the wound with a sterile packet; (4) foreign bodies are removed primarily, especially pieces of cloth; (5) large gaping wounds may be partly brought together by stitches; (6) bleeding vessels may be ligated, tendons and nerves united, tracheotomies and urethrotomies performed; (7) in considering injured limbs the surgeon must be conservative, but still amputate when necessary ;(8) broken bones do best under a plaster of Paris dressing; (9) use anesthetics even with the least painful surgical step; use ether as a rule, but chloroform when lighting is by the open burner; (10) change of dressings without good reasons to be avoided; (11) hand disinfection of the operator to be done exclusively with 70 per cent alcohol without previous washing in water; when blood is to be removed with the use of water, dry hands, then wash in alcohol.

The transportation of the injured after they have been dressed is done by trained bearers. Transporting by hand is permissible only for short distances; for long distances carriers are to be employed. The nursing is done by the ship's chaplain, Pay Corps men, musicians, barbers, etc. Special attention is needed to satisfy the urgent thirst among the wounded. Abdominal injuries receive no water.

After the battle patients may be moved for light and air. If the ship moves toward its base of operations the seriously wounded are

put on shore; if it continues at sea they are transferred to the hospital ship.

The action being over, the ship is to be cleaned from bloodstains, for which coarsely powdered charcoal is the best deodorizer, and prepared for a possible renewal of activity.—(H. G. BEYER, MEDICAL DIRECTOR, UNITED STATES NAVY, RETIRED.)

MOLINARI, Dr., Marine-Stabsarzt. **Beitrag zur Aetiologie der Narkosenlähmungen (Contribution to the etiology of the paralyses following the administration of anæsthetics).** Veröffentlichungen aus dem Gebiete des Marine-Sanitätswesens, Medizinal-Abteilung des Reichs-Marine-Amts, Heft 4, pp. 24, 6 illustr., Berlin, 1913, E. S. Mittler u. Sohn, Kochstrasse 68–71.

We have, in Heft 4 of the publications by the "Medizinal-Abt. des Reichs-Marine-Amts," the fourth of a series of studies which that bureau has contributed to medical literature and which, as regards thoroughness and completeness of treatment of its subject, is the equal of any of its predecessors. Not only has Dr. Molinari presented us with a critical and exhaustive study of the entire literature of his subject, but he has also added a valuable series of observations of his own, made in a manner to insure confidence in his conclusions.

The conclusions being of fundamental importance, a brief review of the entire article seems desirable.

Nearly 40 years ago Erb had described and localized a peculiar form of paralysis in the brachial plexus. In this form of paralysis the deltoid, biceps, brachialis anticus, and the supinator longus were affected. From a certain point in the neck (Erb's point, above the clavicle) the above-named muscles could be stimulated into contraction. Mechanical pressure upon the plexus over Erb's point was looked upon as the direct cause of the paralysis. Some time previous to Erb's publication, Duchenne had described a paralysis occurring in newly born children which was almost the exact counterpart of that described by Erb. The muscles affected were the deltoid, biceps, brachialis, infraspinatus, and teres minor. Later (1885), Mme. Klumpke described a paralysis having its origin in an injury of the lower branches of the brachial plexus (seventh and eighth cervical and first dorsal), in which the affected muscles were those of the forearm (mostly flexors, rarely extensors) and the small muscles of the hand, with sensory disturbances over the inner side of the hand and forearm. Oculo-pupillary symptoms were present when the roots showed injury at a point before the rami communicantes were given off. About 37 cases found in literature are mentioned, in which operations under an anæsthetic, during which either one or both arms were kept elevated over the head, were followed by Erb's paralysis. Likewise, a case of fall upon the shoulder and one caused by pro-

longed but futile attempts at the horizontal bar trying to "skin the cat."

Pressure by the clavicle upon the plexus, made in the vicinity of the sixth and seventh cervical vertebræ, was generally considered as the cause of the paralysis. Since the changed position of the arms was, besides, sometimes accompanied by the disappearance of the pulse at the wrist, it was supposed that pressure was exerted on the brachial artery in its passage over the head of the humerus.

The term "Narkosenlähmung," given to this form of paralysis by Braun, was, therefore, not one of etiological significance, and proved rather misleading.[1] The anæsthetic could only be said to assist in maintaining an involuntary and forced position of the arms during an operation, for the purpose of watching the pulse.

In all the six cases analyzed minutely by Molinari the side affected by the paralysis in question was always the one on which the arm had been kept in an abnormal position during the operation, for the purpose of watching the radial pulse. Of the 6 cases observed by the author, the upper portion of the plexus only was affected in 3, while in the remaining 3 the entire plexus was involved. In the former 3 cases the arm had been forcibly extended upward and backward, occupying a position near the head of the patient; in such a posture pressure upon the plexus occurs between clavicle and first rib. Such a position can cause a paralysis within two minutes. In the other 3 cases the extreme elevation had been avoided, the arm being raised but slightly above the shoulder joint and kept abducted. In spite of this precaution the pulse at the wrist disappeared, the heart beating normally.

Following up this point, the author made some observations, after exposing the brachial plexus, on the living as well as on the dead body, and the most interesting results were obtained, which are rendered very clear to the reader by six excellent illustrations. In an individual lying on his back the arm may be raised anteriorly up to the height of the shoulder and even higher without producing tension on the plexus. In this position it is of no consequence whether the arm is kept extended or whether it is flexed at the elbow. But if the arm is extended backward, either at the level of the shoulder or above it, a strong tension of the plexus occurs over the projecting head of the humerus throughout the whole length of the plexus. This tension becomes extreme when the upper arm is rotated inward, while at the same time the head of the individual is turned in the direction opposite to that of the extended arm. In this manner all the branches of the entire plexus may be put on the stretch up to the points of their exits from the vertebral column. At the same time

[1] Opinion of the reviewer.

the brachial artery in its course over the head of the humerus becomes completely flattened. It is easy to convince one's self by observation on the living subject that in such a position of the arm the radial pulse disappears. During narcosis, when the muscles are relaxed, such a result, of course, is much easier to obtain. Pressure between the clavicle and first rib can not occur in this position and the clavicle simply arches over the first rib, leaving both plexus and artery free to pass. If now the arm is raised from a position at the level of the shoulder to a vertical position the extended plexus over the head of the humerus becomes relaxed and in proportion as the vertical position is approached, while the suppressed pulse reappears at the wrist. In place of this, however, with the arm in this position, especially when pressed against the head of the individual, we get a severe compression of the plexus between clavicle and first rib near their acromial extremities; the upper two roots are pressed flat; the seventh is scarcely affected; the eighth and the brachial artery remain free.

It seems clear, therefore, that at least two principal etiological factors are involved in injuries to the brachial plexus through forced positions of the arms during operations: (1) Overstretching of the plexus in its passage over the head of the humerus, and (2) compression between the clavicle and first rib.

With regard to the prognosis, the paralysis is not to be taken lightly, recovery from it having in some cases been delayed for years. Faradization, active and passive movements, aided by massage, should be commenced early.

The prophylaxis consists in placing the arm during operation in a position which will neither overstretch nor compress the plexus, while still permitting of easy observation of the pulse. (H. G. BEYER, MEDICAL DIRECTOR, UNITED STATES NAVY, RETIRED.)

WALTON, ALBERT J. **Extrasaccular hernia.** Annals of Surgery, January, 1913.

The "sliding" hernia of the large intestine and bladder are more common than formerly supposed, are very puzzling when encountered, and are difficult to successfully repair.

Recurrences are common, and Lockwood even goes so far as to say that "prudence dictates that they should be avoided."

1. Sliding hernia of the cecum may at times be diagnosed before operation in patients with thin abdominal walls, but usually it is discovered at operation.

In these cases the following operation is advised by the author: The usual skin incision; incision of external oblique; sac freed and opened at fundus; opening in sac enlarged along interior surface to give good view of the contents.

A posterior "Y" shaped incision of sac is next made, the tail of the "Y" being carried to within one-half inch of caput ceci; then, dividing into the arms of the "Y," it is carried along each side parallel to the side of the cecum, and one-half inch from it, to the neck of the sac.

The cecum is then pulled forward, and the flaps formed by the arms of the "Y" are sutured *behind* it to complete its peritoneal covering. It can then be reduced readily, and the sac, after being "repaired," is treated as recommended by Kocher.

2. Occasionally the presence of the bladder in an inguinal hernia can be diagnosed before operation by (*a*) its being partially irreducible; (*b*) fluid injected into bladder may increase size of hernia; (*c*) micturition may take place in two stages; and (*d*) there may be frequent desire to micturate.

At operation an excess of irreducible tissue internal to the sac should place the operator on his guard. Verification is secured by catheter or by injecting fluid into the bladder.

For these sliding herniae of the bladder a procedure somewhat similar to the one for the cecum is used, except that after the incision is completed the sac is drawn *forward* and repaired before being drawn up by the Kocher method. The bladder, left partially uncovered by peritoneum, is returned to the "Cave of Retzius." The muscular wall is closed firmly in the usual way.

3. Hernia of the iliac or pelvic colon may occur, but is rare and is treated by the same principle as used in dealing with the cecum.

As the opening of the bladder during an operation for hernia is a very serious accident and as recurrences after former operations for sliding hernia were frequent, this article is well worth careful study by operators.—(H. C. C.)

NOLAND, LLOYD, and WATSON, FRED C. **Spontaneous rupture of the malarial spleen.** Annals of Surgery, January, 1913.

The authors state that in 30,000 cases of malaria admitted to Colon Hospital during the last eight years there have been only three cases of spontaneous rupture of the spleen, and in these careful questioning failed to elicit a history of even slight trauma.

These cases came to operation and two recovered.

The symptoms are similar to traumatic rupture; severe abdominal pains, worse above and to left of umbilicus; general tenderness with marked rigidity of abdominal muscles, some dullness in flanks and a malarial history. If the tear is extensive, shock and collapse are proportionately severe. Treatment is surgical and consists in exposing the spleen and controlling hemorrhage by tamponage. This is pre-

ferred to an attempt at removal of the organ. The following are given as conclusions:

(1) The spontaneous rupture of the malarial spleen occurs in rare instances.

(2) That the spleen does not necessarily have to undergo a great degree of enlargement for spontaneous rupture to occur.

(3) That very deep palpation or forcible percussion of the enlarged malarial spleen should be avoided.

(4) That exploratory puncture of the spleen for diagnostic reasons is not without danger.

(5) That the treatment of spontaneous rupture of the malarial spleen is surgical and that early operation is indicated in all cases in which the condition is suspected.

This article is considered by the reviewer as of special value, because of the unique opportunity which Dr. Noland has had to study surgery in its relation to malaria and the careful and excellent work done by him both as a diagnostician and operator.—(H. C. C.)

HYGIENE AND SANITATION.

C. N. Fiske, surgeon, and R. C. Ransdell, passed assistant surgeon, United States Navy.

Munson, E. L., Medical Corps, United States Army. **Gaseous disinfection of equipment in the field.** The Military Surgeon, Vol. XXXII, No. 2, February, 1913.

In a paper read before the twenty-first annual meeting of the Association of Military Surgeons of the United States, Maj. Munson presented an original method and an original apparatus by which gaseous disinfection of the equipment of the soldier in the field might be accomplished in 20 minutes and the destruction of insects, vermin, and parasites thereon within half that time. The apparatus consists of two parts—a generator supplying the disinfecting gas and a container in which the latter may be applied in a concentrated form to the articles to be disinfected.

Briefly described the generator is a cylindrical apparatus 8 inches high and 6 inches in diameter, weighing 5 pounds, and made of brass or copper. It consists of "but four parts: (*a*) An outer container, (*b*) a cover and gas bell, (*c*) a mixing can to hold liquid chemicals."

The *outer container* is a simple cylinder with a solid bottom and a cap held in position by thumbscrews. It is perforated near the top for the attachment of two short tubes, one left permanently open, thus providing a vent to prevent explosion, the other controlled by a turn cock.

Cover and gas bell.—This is a top, with tight gasket on its lower rim held in place with thumbscrews so as to produce a gas-tight joint. The top is perforated for the passage of a plunger, which operates the

dosing box (referred to below) when its contents is to be discharged into the mixing can. From the under part of the top projects a cylinder reaching to within one-half inch of the bottom of the outer container and of such diameter as to be one-quarter inch from its sides. This forms the gas bell and prevents the chemicals harmful to fabrics being thrown out with the gas and watery vapor evolved. The whole apparatus may be tipped over without solid or liquid chemicals passing out.

The *mixing can* is a tight-bottomed cylinder, set on a frame which raises it three-eighths of an inch from the bottom of the outer container. It extends upward inside the gas bell and separated from its sides by a one-quarter inch space to within an inch of its top. On the upper rim of the mixing can are four slots to receive corresponding projections on the dosing box.

The *dosing box* is a cylindrical metal box, flush with and supported on the upper rim of the mixing can. Its hinged bottom is held up by a spring catch opposite the hinge, which is released when required by pressing down on the plunger above referred to.

The impermeable gas container for articles to be disinfected may be either expansile (as bags made of the rubber sheeting furnished by the Medical Department, a soldier's poncho, or heavy paper bag, the edges held together with ZO plaster), or inelastic (as a trunk, box, or room). The former type of container is preferable, as there is less air to dilute the gas.

The generator may be used either inside or outside of the bag or other container. When used within the container the heat generated and radiated from the apparatus adds to its efficacy, this advantage being somewhat reduced when the generator is outside the container and the gas fed through the rubber hose.

Formalin and potassium permanganate are used to generate formaldehyde gas, and the proper proportions and quantities of each are given. It may also be used to produce hydrocyanic-acid gas and, with slight modification, sulphur dioxide. The concentration, high temperature, and high humidity of the gas and the rapidity with which it is delivered, render the formaldehyde lethal for insects as well as bacteria. As the "dose" of the gas has been greatly increased, the length of exposure can be correspondingly reduced. When the generator is used within the container the danger of polymerization is almost nil, and the method and apparatus may be regarded about 86 per cent efficient.

The simplicity of its structure renders the generator practically "fool proof" and readily cleaned, while its compactness and light weight make it easily portable. Its cost is relatively slight, while its efficiency is many times greater than any other apparatus.—(J. L. NEILSON, SURGEON, U. S. NAVY.)

MÜLLER, P. T. **New rapid method for the bacteriological examination of water and its application to the testing of springs and filter beds.** Arch. Hyg., 1912. vol. 72, pp. 88-223.

One hundred cubic centimeters of the water to be examined are placed in a measuring cylinder with 5 c. c. of formalin and 5 drops of $FeCl_3$ solution, mixed, and allowed to settle for 15 to 30 minutes. The clear liquid is poured off and the precipitate is treated with 5 drops of a concentrated alcoholic solution of gentian-violet. It is then transferred to a specially shaped centrifuge tube and after dipping for about a minute in the boiling-water bath, it is centrifuged for a short time. Two hundredths of a cubic centimeter of the precipitate is transferred by means of a serological pipette to a microscopic slide. The author employs a slide which has been etched in such a manner that a square of exactly 1 cm. remains clear. The precipitate is placed in the middle of this square and evenly spread by a small platinum loop. The preparation is dried over a small flame, and thus fixed is covered with a drop of cedar-wood oil and examined without a cover glass with an immersion objective and the organisms counted. With water containing 9,500 to 740,000 organisms per cubic centimeter, 99 per cent of the organisms are precipitated by a single treatment with $FeCl_3$. Highly infected waters should be suitably diluted before treatment.

In testing spring waters the number of organisms found by this method was always higher than the number of colonies counted on plate cultures. When this method showed a water containing few organisms, cultivation on gelatin plates likewise showed only a few colonies. On the other hand, waters which showed only a few colonies on plate cultures showed sometimes fewer and sometimes far more organisms by the precipitation method. Deep-bore waters were found both by plate cultures and by organism counting to be nearly sterile. The method is readily applicable for the rapid control of the efficiency of sand filter beds.—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

HOWARD, B. J. **Decomposition and its microscopical detection in some food products.** U. S. Dept. Agr. Yearbook, 1911, pp. 297-308, pls. 5.

Causes of decay, methods of examination, molds, yeasts, bacteria, and animal invasions in foodstuffs are discussed with special reference to their detection by means of the microscope, as well as the susceptibility of different products to decay, organisms that may be properly present, and economic considerations. The article is based on the author's studies and is illustrated with reproductions of microphotographs. The buying of crops in proper condition by the con-

sumer, the effect of decay upon losses to the canner, and similar questions are also discussed.

"To efficiently solve the problem, the method of handling some products must be changed, since under present conditions it is practically impossible in some cases to get them to market in proper condition. In such an event it may be necessary to pack the product nearer the source of supply, instead of depending upon raw material that has spent a sufficiently long time in preparation to allow a more or less advanced state of decomposition to occur. The question of handling, from producer to consumer, is therefore of primary importance, as well as the methods of manufacture; in fact, the two problems are so closely related that no solution is practicable that does not consider both factors."—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

BARUCH, SIMON, M. D. **A substitute for fresh air.** Medical Record, Vol. LXXXII, No. 20, Nov. 16, 1912.

Several notable articles on fresh and vitiated air in relation to hygiene and therapeutics have led Baruch to insist that chemical purity is of little relative importance compared with the matter of currents of air which, encountering the skin, influence respiration through vasomotor reflex:

The recent investigations of Hill in England, and Fluegge in Germany, make it highly probable that the effects of fresh air or vitiated air are brought about not by direct action upon the lungs but indirectly through the skin. It appears probable that the temperature and moisture of the air surrounding the body are the essential elements. The condition of the skin exerts a potent influence upon the lungs. This may be in part a vasomotor reflex acting upon the pulmonary circulation. The evidence accumulated during recent years indicates that the lungs are not mere passive organs through which gases diffuse as through nonliving membranes; under certain conditions they secrete oxygen into the blood. The evidence available, although still far from complete, suggests that these pulmonary activities are indirectly but powerfully influenced through conditions affecting the skin, and that it is in this manner that ventilation influences both.

The practical application of these views may be of great value in therapeutics. The experiments of Fluegge were made on himself and seven students in a properly constructed room three meters square. Three electric fans were secured to the ceiling and an electric stove to raise the temperature. It was found that when the temperature of the room was raised to 82° the experimenters began to suffer the usual ill effects of rebreathed air; when these effects could no longer be borne the fans were turned on with relief from all symptoms that were formerly regarded as due to increase of CO_2. Hill's experiment with himself and another person confirmed Fluegge's result; he also had a bag containing CO_2 emptied into the room, without an appreciable increase of the distressing effects. The fans removed the latter.

Now these observations would serve as a lesson to teach us to compensate for air vitiation by promoting the circulation of the air in rooms to which fresh air can not be admitted in sufficient quantities. I have already advised

this process in a room which is frequented by many and in which the air "feels close," despite the fact that artificial ventilation supplies thorough "fresh-air renewal," according to the engineer in charge. It was found that whenever the fans are turned on the air "feels fresh" for some time; when they are quiet the room feels stuffy. This experience proves that it is not the absence of fresh air which causes unpleasant effects, but the absence of air currents.

The introduction of fans, which are now so easily obtained, would be a great improvement in hospital and schoolroom construction, as well as in private houses, especially in rooms used for patients suffering from infectious diseases. It would be wise to make control experiments to ascertain the effect of outdoor treatment compared to indoor treatment with fans. Theoretically the substitution of the former by the latter is sound. I would not wish, however, to be understood as advocating this procedure when an ample supply of fresh air is available. And under these conditions I should favor the addition of fans to enhance the refreshing action. In my lectures on physiology of the skin I have laid stress on this newly discovered action of air currents as vasomotor stimulants, and cite them as being analogous to the vasomotor action of water below skin temperature, which, being applied to much larger surfaces, is far more powerful, especially since water conveys temperature to the skin 27 times more rapidly than air. As this may be regarded as a theoretical statement, I would suggest to any doubter to arrange the temperature of the bathroom at 70° F., and to fill the bathtub with water of precisely the same temperature. The air at 70° would be found comfortable by the nude skin, while the water at 70° would be found cool, and soon chilliness will ensue. There is a rational basis for hydrotherapy as there is now found to be true of aerotherapy. Both are based upon vasomotor action, but water acts upon larger areas of nerve terminals.

The letter from which the above quotations are taken has attracted attention in this country far wider than the original publication on which it is based, and might be considered with a view to application in certain engine-rooms, firerooms, central stations, and other overheated compartments on shipboard where, for a relatively short time, as in action, the personnel must be made as comfortable as possible in order to render intelligent and the most efficient service possible.—(C. N. F.)

MELVILLE, C. H., BEVERIDGE, W. W. O., and WALKER, N. D., R. A. M. C. **Some observations on metabolism in connection with an experimental march.** Jour. R. A. M. C., Vol. XIX, No. 6, December, 1912.

Nitrogen and water determinations are now shown from a practice march (referred to in an earlier lecture and reviewed in Bulletin, Vol. V., No. 4, p. 519), and extended analysis of results leads the authors to two practical deductions:

The first is that if a man has to go short of water for one day the effect on the water available for perspiration—that is, for temperature regulation—may persist, even in a well-trained man, for about 48 hours. The mere fact that a plentiful supply of water is available on the next day will only tend to increase his urinary secretion, not to redress at once the disturbance in water

content of his dehydrated tissues. A similar, though perhaps a less marked, effect will follow an uneven allowance of water on any one day, as, for instance, when water is not available on a long march, but only at its termination. It is extremely important, therefore, to regulate the supply not only from day to day, but also in the course of every day.

The second point is the importance of training in lessening the demand for "water available," due almost certainly to more efficient "condition." As long as a man is soft, therefore, his water supply needs far more careful regulation than when he has got into good campaigning condition.

The original paper should be consulted by those interested in the intricacy and accuracy of the methods pursued.—(C. N. F.)

DOMINGUEZ, A., Dr. **El servicio de desratizacion y la peste bubonica.** Sanidad y Beneficencia, Tomo VIII, Nums. 1–2–3, July, August, September, 1912.

The third medical officer of the port of Habana records the obstacles to and the measures successful in deratization in the presence of bubonic plague last summer. Traps, circular orders to householders, and "tablets of rat bane" were distributed, the obligatory use of metal-covered garbage cans was attempted, and reenforced concrete was required to replace cement and wooden floors of buildings and wharves within the infected area of city blocks. Rats were collected from traps by block inspectors, provided with a special case containing waterproof bags for holding the water-bichloride drowned rats, tags for bags, 750 grams of crude oil for sprinkling on the carcasses, and fresh rat bane for distribution. An ambulance made rounds to transport the rats to laboratory at 8 a. m., 12.30 and 3 p. m. Tags marked "V" indicated that rats had been caught alive or killed intentionally, whereas those marked "M" indicated that they had died spontaneously and were consequently suspicious. [It is not shown how the poisoned rats, to be tagged "V," could be distinguished from those to be tagged "M."] A bounty was also placed on rats, which brought in 9,000 of the 12,700 gathered during the first 22 days. Daily reports of inspectors, in addition to personal inspections at night, showed what employees and methods were successful and whether garbage cans were being provided, used, kept covered, and without spilling of garbage. More than 2,000 fines were imposed by the medical officer. Thieves and vagabonds had to be carefully watched by the police, in order that they should not gain entrance to the open houses, impersonating workers in sanitary force, and stealing of garbage cans required constant vigilance. It appears that there was a large number of mendicants who were in the habit of searching the contents of garbage cans and spilling refuse, and these also required the attention of the police. By actual experience it was found that rats elected to enter traps which were

uncovered in preference to the many covered ones. Actually 27 had crowded themselves into one trap, the last one being able to get only his head inside.

The new sewage system facilitated deratization, while in those blocks where the older methods and drainage ways prevailed propagation was rife.

In Dominguez's opinion plague rats were either brought from the Canary Islands, where the disease is epidemic, or from Porto Rico in potatoes brought by coffee steamers—nearly all the evidence indicating the latter source.—(C. N. F.)

MORRIS, A. H., major, R. A. M. C. **Report on water purification by chloride of lime at Bir-id-Dehib camp, Malta.** Jour. R. A. M. C., Vol. XX, No. 1, January, 1913.

The methods followed so successfully as to eliminate lactose fermenters from 100 to 200 c. c. of water, which formerly showed them in 10 c. c., was to cause to drop into an upper treating tank a 1 per cent solution of chloride of lime at such a rate that 50 c. c., well diluted, would drop from the suspended bottle while the tank was being filled to 100 gallons. The treated water was then allowed to flow into the larger storage tank below ready for use. The rapid disappearance of slight odor and taste is attributed to the admixture of untreated water and lime solution with air in falling together from a height. The untreated water should contain very little organic matter. The chlorinated lime used was found to give 17.5 per cent of available chlorine, so that 1 c. c. of 1 per cent solution added to 2 gallons of water gave approximately one part of the chlorinated lime to the million parts of water. The bottle had fitted a tube and thumb screw which regulated the drip; into it was placed the computed amount of lime solution (which must be fresh and kept in the dark until used) and the bottle allowed to fill with water to insure better dilution, longer dripping, and a more intimate mixture.—(C. N. F.)

TROPICAL MEDICINE.

E. R. STITT, medical inspector, United States Navy.

STRONG, R. P., and CROWELL, B. C. **The etiology of beriberi.** Philippine Journal of Science, August, 1912.

The authors state that the object of their study was to determine whether beriberi as it occurs in the Philippines is an infectious disease or whether it is one which has its origin in disturbances of

metabolism due chiefly to the prolonged use of polished rice as a staple article of diet. The experiments were carried out in Bilibid prison. Prisoners who had been condemned to death were informed of the nature of the experiment and were told of the diet on which it was proposed to place them. They were also told that they might perhaps contract beriberi. Twenty-nine volunteered, and each signed a statement in his own dialect that he undertook the experiment entirely voluntarily.

In general the groups were fed for the greater part of the time occupied by the experiments, as follows:

Group I: White rice and extract of rice polishings and special diet.

Group II: White rice and special diet.

Group III: Red rice and special diet.

Group IV: White rice and special diet.

Of 6 men on the Group I diet, 2 developed beriberi; the symptoms, however, were not marked, being chiefly loss of weight, tachycardia, slight edema of legs, and tenderness of muscles of calves.

Four of the 6 men in Group II developed beriberi and 6 out of 11 in Group IV showed symptoms of beriberi. In Group III only 2 in the 6 developed symptoms, and these consisted, in case No. 13, only in tenderness of epigastrium, paræsthesia, cardiac disturbance, and marked diminution of knee jerk. In case No. 18 there was noted only slight cardiac disturbance and epigastric pulsation. In none of the cases was the complete picture of beriberi obtained except in those in which white polished rice formed the staple article of diet, but in one case fed on red rice the diagnosis of beriberi was almost definite.

The results of the experiments with rice polishings would indicate that whatever may be the results obtained with extracts from this material in treating the polyneuritis of fowls or in curing it after it has developed, it is not as efficient in man as the cheaper and more readily obtainable mongo bean or yeast.

Its use, however, would appear advantageous in infantile beriberi.

Evidently symptoms of beriberi may also sometimes occur in individuals fed on red rice as a staple article of diet when the diet is very monotonous, comprising few articles and continued for long periods of time.

From the experiments it is evident that beriberi may be produced by the prolonged consumption of white rice as a staple diet. Of 17 individuals fed on such diet 8 developed beriberi, all with distinct loss of knee jerk as well as with other marked symptoms of the disease. Symptoms appeared within 61 to 75 days of the commencement of the diet. In Fraser and Stanton's experiments no case of beriberi occurred in less than 87 days and the majority in from 120 to 160 days.

It is stated that none of the experimental cases showed any symptoms of scurvy.

In conclusion, it was noted that beriberi has a true dietetic causation and that the rigid isolation of their volunteers excluded the possibility of the introduction of an infectious agent.—(E. R. S.)

GREIG, Dr. E. D. W. **Recent research on cholera in India.** The Indian Medical Gazette, January, 1913.

Greig notes that even in 1911 the impression prevailed that infection with cholera was limited to the alimentary tract and that the absence of cholera spirilla from the gall bladder and bile ducts was an important point of difference between typhoid fever and cholera.

At the Jagannath festival at Puri in 1912 Greig examined the bile in 271 fatal cases of cholera and cultivated the cholera vibrio from 80 of these cases. Distinct pathological changes were found in 12 of these 80 gall bladders. Serial sections of these 12 gall bladders showed the cholera spirillum not only on the surface of the mucous membrane but also in some of the specimens deeper in the submucous tissues.

This infection of the gall bladder has an important bearing on the carrier question. Cholera spirilla are apt to be crowded out by intestinal organisms when in the alimentary tract, but in the bile of the gall bladder they find ideal conditions for a prolonged life. In fact, Ottolenghi has recently recommended bile as a selective medium for enriching the cholera vibrio.

Greig believes that his researches explain the mode of production of the " chronic carrier " in cholera.

At Puri the author examined the stools of the convalescents from cholera who were leaving the cholera hospital for their homes in all parts of India. He found 36 per cent excreting cholera spirilla. In two convalescents he found cholera spirilla being excreted 30 and 44 days after the acute attack.

Examination of 27 persons who had been in close contact with cholera cases showed that 6 were excreting cholera spirilla, although apparently healthy at the time.

He notes that the discharge of cholera spirilla in the stools of convalescents is very intermittent.

A very important observation was that convalescents who were carriers showed agglutinins in their sera, while those who were not excreting cholera vibrios failed to do so. He considers healthy carriers and flies as the main channels of infection.—(E. R. S.)

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THOMSON, DAVID. **The destruction of crescents: Conclusions regarding the prevention of malaria by the administration of quinine.** Annals of Tropical Medicine and Parasitology, July 31, 1912.

The author states that it would appear that the male crescents are quite as resistant to quinine as the female variety; and that no drug or other method has been found which can directly destroy them, and that this can be accomplished only by indirect means; that is, by destroying the asexual parasites, the crescent producers.

The natural term of life of crescents is stated to be about three weeks, and by attacking the asexual forms with quinine or methylene blue the disappearance of crescents should occur in about three weeks from the attack on the crescent producers. He thinks that it is not to be regretted that we have no specific agent for the destruction of crescents, because every case of malaria should have a prolonged course of treatment for at least a month to destroy the asexual parasites. He thinks that relapses can be explained as well by survival of asexual forms as by parthenogenesis. Certain cases of malaria may show great resistance on the part of the asexual parasites to quinine.

As regards quinine prophylaxis, he states that five-grain doses daily are insufficient both to prevent infection from mosquitoes and to eradicate malaria from the system. Furthermore, this amount of quinine makes the blood less suitable for the malarial parasites, and hence tends to keep the disease latent without properly curing it.

He states that an ideal method is the administration of quinine in doses of 20 grains daily for three weeks. After this the person will be noninfective for mosquitoes and in the majority of cases will be cured of the disease. Very few cases have a tendency to relapse after this treatment. Note is made that after the third day very few people feel any inconvenience when taking 20 grains of quinine daily.—(E. R. S.)

BALFOUR, DR. ANDREW. **A case of blackwater fever showing the cell inclusions of Leishman.** Jour. Trop. Med. and Hygiene, February 1, 1913.

The author discovered the chlamydozoalike bodies in the peripheral blood of a patient suffering from blackwater fever. He notes that he injected 20 c. c. of the blood of this patient into a monkey, and that no untoward effects followed in the monkey. Further on in the article he states that in examining the blood of an officer who had fever and had been taking quinine, but in whose blood he could not find malarial parasites and where there were no clinical manifestations of blackwater fever, he found these chlamydozoalike bodies. He suggests that as some insects contain hæmolysins, it is conceivable that as the result of a patient already debilitated by malaria or other diseases being bitten by many such insects there may

be injected into him sufficient hæmolysins to bring on blackwater fever. Even if sufficient hæmolysin were not injected, repeated injections might heighten the hæmolytic action.

NOTE.—In view of the importance of anaphylaxis, this view advanced by Balfour may have an important bearing on the etiology of this much-discussed disease.—(E. R. S.)

PATTON, W. S. **The kala-azar problem.** British Medical Journal. November 2, 1912.

Patton has noted that when either *Acanthia lectularia* or *Acanthia rotundata* are allowed to feed on patients having *Leishmania donovani* in their peripheral circulation that the parasites develop into the flagellate stage in the bedbug and are present in large numbers from the fifth to the eighth day. The flagellate forms change into the post-flagellate forms by the twelfth day and are then found in the bedbug's stomach.

If, however, he allowed the bedbugs to have a second feeding of human blood after the infecting feeding above described the flagellates degenerated and disappeared within 12 hours. He was unable to infect dogs or monkeys, but succeeded in infecting a white rat by intraperitoneal inoculation with splenic emulsion. Patton has been unable to note any development of *Leishmania donovani* bodies in Conorrhinus or in the rat flea.—(E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

M. E. HIGGINS, passed assistant surgeon, and G. F. CLARK, passed assistant surgeon, United States Navy.

MARTIN, Dr. C. J. **Insect porters of bacterial infections.** British Medical Journal. January 4 and 11, 1913.

Taking up first the house fly, he notes that each leg can be considered as a minute paint brush, owing to the numerous fine hairs covering these structures. A well-fed fly deposits feces abundantly, ten times in the first hour after feeding. A fly also regurgitates the contents of his crop in order to render soluble dry material upon which he may choose to feed. The factors of the fly being born in a fermenting dung heap and flitting from this to the milk pan, thence to any available fecal matter, and then back to the sugar bowl, would suggest this insect, with its hairy, sticky legs, its habit of frequent defecation and constant regurgitation, as an excellent inoculating medium for any bacterial infection.

There are numerous recorded instances of the presence, either in the dejecta or alimentary canals, of flies of the organisms of cholera,

typhoid, tuberculosis, anthrax, and plague. The fly has been on good grounds incriminated as the carrier of the Koch-Weeks bacillus and the gonococcus, thus spreading ophthalmia.

The importance of the fly in spreading typhoid fever is proven by the work of the American Army Commission in 1900.

Again, in infantile diarrheas the fly is of importance. Although American workers have chiefly found bacilli more or less related to the Flexner dysentery strain as connected with this affection, the English bacteriologists have found a nonacid mannite organism, Morgan's bacillus, No. 1, as the more constant bacterial cause. As Morgan's bacillus has been found in flies captured in houses in which this affection prevailed, it is probable that the fly is an important factor in the spread of this disease. Furthermore, infantile diarrheas exhibit a close time relationship with the fly prevalence.

Next, taking up the flea, he notes that a plague patient is a negligible source of danger to his surroundings, provided he does not develop a secondary pneumonia. From an epidemiological point of view, pest is a disease of rats.

The average capacity of a flea's stomach is about 0.5 c. mm., and the number of bacilli in a rat's blood before death from plague may equal 100,000,000 per cubic centimeter, so that such a flea could imbibe 5,000 plague bacilli. Furthermore, evidence collected by the Indian Plague Commission showed that the bacilli multiplied in the alimentary canal of the flea after ingestion, so that the bacilli were often present in immense numbers. The blood on completion of digestion passed out at the anus as minute tarry droplets, often crowded with plague bacilli. While experiments have shown that the wound made by the flea in biting may afford an entrance for the bacilli contained in the feces, yet it may also be possible for infection to take place in consequence of regurgitation by the flea. Animal experiments have shown that rat fleas could transmit the disease from one animal to another, but this experiment is naturally not applicable to man.

Much importance has been attached to the criticism of Galli-Valerio that rat fleas do not bite man. The author made hundreds of experiments with *Ceratophyllus fasciatus* and found that it would bite man as readily as the rat.

It is possible to transmit plague experimentally by means of *Pulex irritans.* Nevertheless, the direct transmission of the disease from man to man can not at the present time be of frequent occurrence. Again, the average degree of septicemia in man is so much less than in rats that the chance of a human flea imbibing even a single bacillus is small.

The body louse in the transmission of typhus fever.—Lice, unlike fleas, have no grub stage. The young louse resembles the parent and

sucks blood at the earliest opportunity. It is not sexually mature for 14 days. The body louse lives in the clothing and feeds several times during the day, thriving best on those who seldom wash their clothes and do not change the clothing for sleeping. The pricker of the louse is kept retracted, and when protruded for biting is held in place by a ring of hooklets which penetrate the skin. The infection of typhus circulates in the blood during and for some time after the febrile period. The infectivity of the louse endures about seven days and seems greater some time after feeding than immediately. There seems to be reason to believe that typhus may be transmitted to a second generation of lice. The disease is limited to vermin-infested sections of the population and does not occur under modern hospital conditions.

Transmission of African relapsing fever by the tick, Ornithodorus moubata.—Koch thought that the infection passed by way of the salivary glands during the act of sucking, but Leishman and Hindle consider that the infection passes from the malpighian tubules to the rectum and that by the rubbing of the feces into the puncture wound the infection occurs.

European relapsing fever seems to be spread by the louse, although experimentally it can be transmitted by the tick *O. moubata.*

As regards the bedbug, it apparently will not experimentally transmit typhus or relapsing fever, and although plague can be experimentally so transmitted, the bedbug does not seem to be an epidemiological factor. Notice is taken of the transmission experimentally of the virus of poliomyelitis by Stomoxys.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

WENYON, C. M., M. B., B. S., B. Sc., protozoologist to the London School of Tropical Medicine. **Experimental amebic dysentery and liver abscess in cats.** Journal of London School of Tropical Medicine, December, 1912.

Hlava and Kartulis first showed that cats and dogs could be infected with amebic dysentery by the injection per rectum of the mucus of feces from cases of amebic dysentery in man. Kruse and Pasquale produced dysentery by injection of material from an amebic liver abscess which was sterile from a bacteriological standpoint. Jurgens stated that the ameba actually forced their way through the healthy mucosa of the cat's gut and Schaudinn attributed this power to the possession of tough ectoplasmic pseudopodia by the *Entameba histolytica.*

Viereck examined ameba from cases of dysentery and found that the mature cyst contained four nuclei and called it *E. tetragena.* The ameba of Viereck has now come to be looked upon as the common pathogenic ameba of man. Hartmann has reexamined many of

Schaudinn's preparations and finds that his *E. histolytica* in most cases at least corresponds with *E. tetragena.*

It seems highly probable that the budding spores described by Schaudinn were other structures not connected with the ameba. It was by reason of the life history that Viereck named his ameba *E. tetragena,* and if it be true that *E. histolytica* has the same life history as *E. tetragena* we must drop the name *E. tetragena* for the common pathogenic ameba of man and make use of *E. histolytica* instead.

Wenyon notes that out of a large number of observations he has been able to find typical cysts of *E. tetragena* only on six occasions. When they occur, however, they usually do so in large numbers. As a rule, it is only as the patient is recovering from dysentery that we find the encysted *E. tetragena.*

It has been shown that while injection of ameba themselves per rectum into cats will produce dysentery, that it is only with the encysted forms that infection per esophagus will occur. For success it is important to use only kittens which have just become independent of the mother.

He notes the rather frequent observation of ameba in the mesenteric glands draining the dysenteric ulcers, some of the ameba in these glands showing phagocytized gland cells. One of Wenyon's cats developed liver abscess. Wenyon believes that it is through some toxic agent eliminated by the ameba that the epithelial cells of the large intestine are softened, and that the ameba penetrates as a result of this softening process, and not by reason of boring through with tough pseudopodia. Cats injected with *E. coli* did not develop dysentery.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

LURZ, DR. RICHARD. **Über das Vorkommen und die Lebensbedingungen von Ankylostomen und Strongyloides Larven in Daressalam.** Archiv Schiffs- und Tropen-Hygiene, Bd. 17, Heft 2, 1913.

The author states that favorable conditions for the development of ankylostoma and strongyloides larvæ exist in Daressalam. These develop in all places where they are protected from the rays of the sun by grass, foliage, fallen leaves, etc. The rainy season favors their development on account of the absence of the injurious effects of light.

Laboratory cultures show the infectious stages of both ankylostoma and strongyloides larvæ in three days. Both eggs and larvæ are destroyed by sunlight.

Lurz notes that while eggs of ankylostoma which might be deposited in water would not develop to the infectious larval stage,

yet such eggs deposited upon soil near the body of water could develop into infectious larvæ, and these wander to the adjacent water. This would, however, be of little importance, as the larvæ would tend to sink to the bottom.

In German East Africa the infection with nematode larvæ is due most frequently to the preference shown by the natives for depositing their feces away from their homes and in places where the grass and foliage protect the larvæ from the sun, thus enabling them to undergo development to the infectious stage, at which time the larvæ are actively motile and tend to climb up blades of grass and plant foliage. In a short time the entire space around the place where the stool was deposited is infected. Then these larvæ on the ground, upon the blades of grass, and upon the foliage are ready to drop on the bare skin of any native passing by and bore their way into the subcutaneous tissues.

In damp, muddy places, near washing pools, where fecal contamination has occurred, one finds many larvæ, in particular larvæ of strongyloides.

For prophylaxis he recommends privies, the keeping dry of privies and bathing places, and the removal of grass and foliage from the environs of the village.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

NOGUCHI, HIDEYO, and MOORE, J. W. **The demonstration of the Treponema pallidum in the brain in cases of general paralysis.** The Journal of Experimental Medicine, February 1, 1913.

Tissues from 70 paretic brains were stained by a modified Levaditi method. *Treponema pallidum* was demonstrated in 12 cases in which the clinical history and post-mortem findings were undoubtedly those of general paralysis. The spirochaetæ were found in all layers of the cortex except the outer or neuroglic layer. They were not found in the vessel sheaths and seldom in close proximity to the larger vessels.—(M. E. H.)

ZINNSER, HANS, M. D. **On Anaphylatoxins and endotoxins of the typhoid bacillus.** The Journal of Experimental Medicine, February 1, 1913.

Zinnser states that Pfeiffer's endotoxin theory furnished an explanation, satisfactory until recently, for the toxemia accompanying typhoid fever, cholera, and other infections, although failing to explain the systemic symptoms in diseases caused by anthrax bacilli, streptococci and other organisms, from the bodies of which no poisonous substance could be obtained.

Recently Friedmann, Friedberger, and others have produced nonspecific, acutely toxic substances (anaphylatoxins) from cells and bac-

teria of various kinds, by treatment with antibody, specific for the cell or organism employed, followed by the use of complement. Thus the toxic substance may appear only after the proteid cleavage of bacterial bodies by the specific antibody and complement.

Zinnser finds that sensitization of typhoid bacilli at 37° C. for from 1 to 15 hours and the action of complement at 37° C. overnight will produce more powerful anaphylatoxin than by sensitization at 3° to 5° C. for 24 hours and treatment by complement at the same temperature and for the same length of time. He also compared the toxic property (endotoxin?) obtained from bouillon filtrates and salt solution extracts of typhoid bacilli with the toxic property (anaphylatoxin) obtained by the action of specific antibody and complement on typhoid bacilli. In the former there were no acute symptoms, although death or symptoms occurred in some instances after several hours or days; while in the latter the toxic action appeared after several minutes—death occurring in two to five minutes, or, when recovery ensued, the animal was not ill long.—(G. F. C.)

CHEMISTRY AND PHARMACY.

E. W. Brown, passed assistant surgeon, and O. G. Ruge, chief pharmacist, United States Navy.

Karpas, M. J. **The chemical interpretations of the serological content of the blood and cerebrospinal fluid, with some reference to cytology and chemistry of the latter, in mental diseases.** American Journal of Insanity, volume 69, No. 1 (1912).

The author maintains that an examination of the blood and cerebrospinal fluid for the Wassermann reaction is necessary for a complete psychiatric and neurological diagnosis; and, further, that a cytological and chemical examination of the cerebrospinal fluid is highly important. The blood examination alone is not sufficient; it should always be amplified by a study of the fluid.

Of 100 cases of general paresis, 96 per cent showed a positive Wassermann reaction in the blood and fluid, 7 per cent only in the blood, and 6 per cent only in the fluid. In 4 per cent the reaction was absent in both.

The author does not confirm the findings of French authors, that in the prodromal stages of general paresis the reaction ought to be present only in the blood and not in the fluid. On the contrary, in the exalted stages both ought to react positively, which the author found was the case in 49 out of 72 cases. In the terminal stages only the fluid should react positively, which the author was able to demonstrate in only 9 out of 22 cases. Lymphocytosis of varying intensity, but not running exactly parallel with the progress of the disease,

was found in all cases with the exception of two. The author formulates his view that the "four reactions," so called, in doubtful cases point almost certainly to an organic process in the central nervous system.

In vascular and gummatous processes in the central nervous system, also in tabes, the author finds only some of the four reactions, never all simultaneously.

In alcoholic psychoses, arteriosclerotic and senile dementia, as well as in the functional psychoses (dementia precox, manic-depressive, etc.), the author found no pathological indications in the fluid; on the other hand, many positive Wassermann reactions were found with blood, which in some cases indicated syphilis.

In epilepsy, as a rule, there are no pathological indications in the cerebrospinal fluid or blood. The author found pathological indications in both in 3 out of 22 cases of epilepsy, which disappeared after antisyphilitic treatment. The frequency of the epileptic seizures, however, was not influenced. The author points out in conclusion that the serological, cytological, and chemical findings are all of the utmost importance in conjunction with the clinical observations.—(E. W. B.)

CHRISTIANSEN, J. **Mett's method for determining the activity of pepsin and the acidity-maximum of peptic digestion.** Biochem. Zeit., 1912, vol. 46, pp. 257–287.

As described originally by Mett, the method consists in filling capillary tubes with egg albumin, coagulating the albumin by immersing the tubes for one minute in water 95° C. and then placing portions of these filled tubes in the pepsin solution to be tested, the latter being maintained at a definite temperature for 24 hours. At the end of this time the tubes are removed, and the extent to which the albumin has been dissolved from the tubes is measured and expressed in millimeters. The author finds that the method is quite suitable for comparing the activity of one pepsin with another, provided that certain precautions are taken in carrying out the test. In the first place, egg albumin varies in its behavior toward pepsin, and the solubility is affected to a considerable extent according to the temperature at which the albumin has been coagulated. It is recommended that the tubes, about 40 cm. long and having internal diameter of about 1.5 mm., be filled with filtered albumin and immersed in a large vessel filled with water at 85° C. and allowed to remain in the water until the latter has cooled to ordinary temperature. When thus prepared, about 10 mm. of the albumin should be dissolved from both ends of a portion of the tube when placed in pepsin solution (0.3 per cent of Armour's pepsin in N/10 HCl) for 24 hours at 37° C. In practice it may be necessary to vary the initial temperature of coagulation a

few degrees so that different albumins may give this rate of solubility in pepsin solution. The stock tubes may be kept for six months if the ends are sealed wih shellac. The author finds that for low concentrations of acid the digestion is proportional to the time of contact, but that after some time the HCl inhibits the action of the pepsin; comparative tests should therefore not exceed 24 hours. It is essential that the temperature of digestion be kept as constant as possible, an alteration of a few degrees affecting the rate of digestion to some extent. In the case of human pepsin, digestion proceeds most rapidly when the HCl is between 0.02–0.033 normal, while for animal pepsin it is between 0.05 and 0.025 normal.—(E. W. B.)

BANG, I. **A new method for determining sugar.** Lunds Univ. Arsskr., n. ser., sect. 2, 7 (1911), No. 8, pp. 1–10, pl. 1. (Ref. U. S. Naval Med. Bul., vol 3, p. 274; vol. 4, p. 400; vol. 5, p. 400.)

The original Bang method is open to the objections that the titration solutions are very expensive, the copper solution is not stable, and an incorrect titration with a copper solution can not be corrected. Attempts were made to displace the potassium sulphocyanid with a cheaper salt, and potassium chloride was found to be a good substitute, it also forming colorless compounds with cuprous oxide, but had the disadvantage of being able to hold only small amounts of cuprous oxide in the solution. The author also noted that better results—end-point determination, etc.—could be obtained if the cuprous oxide was titrated directly and not the unreduced cupric oxide, as in the older method, consequently iodine was selected instead of hydroxylamin.

The solutions required are as follows: (*a*) Iodine 1/100 normal; (*b*) copper solution [Potassium bicarbonate 160 gms., potassium carbonate 100 gms., and potassium chloride 66 gms., dissolved in 700 c. c. of water; the potassium bicarbonate is dissolved first, then the other salts, followed by 100 c. c. of a 4.4 per cent copper sulphate solution, are added and the solution filled to the 1,000 c. c. mark with water. From this stock solution 300 c. c. is diluted to the 1,000 c. c. mark with a saturated solution of potassium chloride]; (*c*) a solution of soluble starch, which consists of 1 gm. in a saturated solution of potassium chloride.

The technic is as follows: 2 c. c. of the urine, which is only one-sixth as strong as the old method calls for, is placed in a 100 c. c. flask with 55 c. c. of the copper solution. A rubber tube about 2 inches long is pulled over the neck of the flask until it stands about two-thirds above the flask. The solution is boiled for three minutes, the tube clamped with a pinch cock, and the flask removed quickly from the flame and cooled, 1 c. c. of the 1 per cent starch solution added,

and titrated with the iodine solution until from 2 to 4 drops produces a deep blue color, which persists from 20 to 30 seconds. The number of cubic centimeters of iodine solution used, divided by 0.267, will give the amount of sugar present in milligrams.—(E. W. B.)

COOPER, EVELYN A. **The relations of phenol and M-cresol to proteins. The mechanism of disinfection.** Bio-Chem., 1912, vol. 6, pp. 362–387.

The absorption of the phenols by bacteria is merely the initial stage in disinfection. The germicidal action which follows is not the result of a chemical union between the phenols and the bacterial proteins (as is the case with formaldehyde), but is associated with the de-emulsification of the colloidal suspension, as evidenced by the precipitation of proteins when a certain phenol concentration is reached. The action thus appears to be similar to heat coagulation. This may explain the fact that below a certain percentage (0.5) the bactericidal action is very feeble, there being a disproportionate falling off in germicidal power when the concentration is reduced to this point.—(E. W. B.)

UNNA, DR. EUGEN. **Ointment bases.** Paper read before the New York Branch of the American Pharmaceutical Association. Merck's Report, January, 1913.

In this paper Dr. Unna makes particular mention of the recent analyses and investigations of wool fat, leading to the discovery and isolation of a very important group of wax alcohols, to which group belongs the water-absorbing power of wool fat. This group of free alcohols of the iso- and oxycholesterin group, named eucerin wax, combines with 700 per cent of water, whereas commercial wool fat has a capacity for from 30 to 200 per cent only, and by the addition of 5 per cent of the eucerin wax we are able to combine any fat with an amount of water up to 300 per cent and even more. A mercury ointment containing more than 75 per cent of metallic mercury may readily be prepared, and it is claimed that in experiments made with this eucerin-mercury ointment five to six minutes' rubbing were sufficient to make it disappear in the skin.

The properties of an ideal ointment base are found separated in the several ointment bases in use at present, but in no one are they combined. Such an ideal ointment base would be one without odor, of a soft consistence, bland and harmless, having stability and a high capacity for liquids, i. e., being miscible to a marked degree with alcohol, water, glycerin, and hydrocarbons. It would seem that in a combination of a small amount of eucerin wax with mineral

fats (vaseline and paraffin) an ideal ointment base has been realized. What this means for the pharmacist in the way of preparing rose-water, glycerin, and other ointments of this class may readily be inferred.

Dr. Unna believes that with the discovery of this group of wax alcohols we have entered a new stage of ointment technic.—(O. G. R.)

Notes. Merk's Annual Report, Vol. XXV.

This volume reviews and discusses the literature pertaining to recent therapeutic preparations and the many advances made in pharmaceutical chemistry and therapeutics during the year 1911. The special articles presented in this annual number relate to the salts of glycerophosphoric acid and to digitalis glucosides and allied drugs (the so-called digitalin group). The latter article is quite comprehensive, covering as it does the general and historical, physiological, and pharmacological, as well as the therapeutical literature of this group of medicines, from their introduction into therapeutics to the present day.

The following extracts taken from this report appear under the chapter "Preparations and drugs":

Acetone-alcohol: Mixtures of acetone and alcohol were used with very satisfactory results by Oeri and von Herff in their surgical practice as disinfecting agents for the hands of the operator and for disinfecting the skin of the patient. Haberle's more recent experiments with a mixture of 30 parts of acetone and 70 parts of alcohol (95 per cent) have confirmed the value of this mixture as a disinfectant. The author used for his experiments either very dirty hands or hands which had been directly infected by cultures of staphylococcus; he first cleansed his hands with soap and a nail brush for about three minutes and then wiped them with a piece of flannel soaked in acetone-alcohol for three to six minutes. His results are reported to have been excellent. This procedure is said to sterilize the surgeon's hands for the time necessary to complete an operation.

Alcohol: As is well known, alcohol has of recent years become of much interest as a disinfectant for the skin. According to a communication by A. Zabludowski the value of alcohol as a disinfectant is considerably increased by the addition of tannic acid. The author places "alcohol-tannin," a solution of 5 grams (75 grains) of tannin in 100 grams (4 ounces) of alcohol (95 per cent), among the best means for the disinfection of the skin. He states that it has not the drawbacks of iodine and iodine-benzine, is much cheaper than alcohol-acetone, acts for a longer period than alcohol by itself, and can be used both for the site of operation and for the hands, while it is said to have no harmful action on the skin. The author's bacteriological experiments show that it is sufficient to treat the hands for two minutes and the site of operation for one minute with alcohol-tannin.

Collodion: A useful, simple method of treating furunculosis is described by W. Fuchs. It consists in surrounding the area of inflammation with a "collo-

dion ring," which stimulates the process and prevents the infection from spreading. For this purpose a collodion ring is painted round the furuncle by means of a brush; the ring varies according to the size of the swelling, but should inclose a free space at least 2 cm. (¾ inch) in diameter. The collodion ring is renewed several times a day; the inner part, which is free from collodion, is kept the same size, while the ring is gradually extended outward. The pressure exerted by the collodion ring on the center forces the tip of the furuncle outward and the inflammation process is made to advance centripetally. This treatment at the same time hastens maturation of the boil, so that in the course of one to three days the tip of the furuncle bursts and the central core is forced out.

In circumscribed dermatitis, leading to an exuberant growth of horny skin, especially for scaling psoriasis, eczema, and lichen, P. Unna uses a "scaling-collodion," viz, collodion containing 10 per cent of salicylic acid and anaesthesine, which a few days after its application causes the skin of the part treated to peel off, leaving a smooth surface.—(O. G. R.)

EYE, EAR, NOSE, AND THROAT.

G. B. TRIBLE, passed assistant surgeon, United States Navy.

PARKER, RALPH H. **The ozena problem.** The Journal of Ophthalmology and Oto-Larynology, Vol. VII, No. 1.

Ozena is defined by the author as an inflammation of the nasal mucous membrane, accompanied by fetor and crust formation. The inflammation is followed by atrophy of the mucous membrane.

Ozena is more prevalent in warm countries. It has been reported as more frequent among Jews than other races (Finder). The ratio of cases reported among females compared to males is as 3 to 1. It is a disease of the young, appearing about puberty in a great many cases.

The affection is usually worse on the more roomy side of the nose; on the narrow side there is less crust formation.

This fact has been made the basis of the paraffin treatment, injecting paraffin beneath the mucosa or incising the mucosa and in inserting sterile paraffin.

Syphilitic lesions often simulate ozena. Postoperative inflammation and crusting resemble ozena—the postoperative ozena of Frankel—especially after turbinate operations.

Ozena occurs as a symptom in prolonged suppurative sinusitis. Many microorganisms have been reported, but none have been constantly present. Often pseudodiphtheria bacilli are present.

The author brings up the unanswered question whether ozena is not a low-grade luetic infection, enough syphilis to give inflammation of the nasal mucous membrane, but not enough for a Wassermann; or if ozena is not a larval form of tuberculosis of the nasal mucosa.—(G. B. T.)

TYLOR, C. **Paths of encephalic infection in otitis.** Brain, November, 1912. Vol. XXX, No. 2.

In the opinion of the author, infection through the vascular channels is responsible for most cases of lateral sinus thrombosis and for a large number of extradural and brain abscesses. Extradural abscesses are also frequently caused by disease of the petrous bone; and if the bone is unaffected, the dura is involved through a septic endophlebitis of a vein of the tympanic mucosa. Direct extension to the brain surface may cause cerebral and cerebellar abscesses. Cerebellar abscess frequently is secondary to an infective labyrinthitis. Leptomeningitis is either secondary to gross intracranial lesion or bone disease or to a labyrinthitis with infection spreading along nerve sheaths or vascular infection from the middle ear direct.—(G. B. T.)

HULEN, VARD C. **General anesthetic in cataract work.** The Journal of Ophthalmology and Oto-Laryngology, Vol. VI, No. XII.

The advantages in the author's opinion are these:

1. Elimination of the personal equation.
2. Rendering the field more thoroughly clean by the use of stronger antiseptics (for instance, bichloride irrigation after the manner of Maj. Smith, I. M. S.).
3. The feasibility of meeting successfully unavoidable complications.
4. It allows the better suturing of the flap, which is desirable in a large flap, following extractions in the capsule.

The disadvantages suggested are:

1. Danger to life.
2. Eliminating the patient's assistance in control of the eye during the operation.
3. The danger to the eye from postanesthetic vomiting and struggling.

In the series of cases reported the results were good; the anesthetic was ether. In one case cocaine and adrenalin were instilled after the patient was etherized.—(G. B. T.)

ROLLET and CURTAIL. **Studies of ocular tonometry.** Revue générale d'ophthalmologie, No. XXX.

After the use of various drugs the tension was taken by means of a Schiotz tonometer, making the first measurement five minutes after the instillation of the drug, and then every five minutes until the return of the tension to normal. Pupillary changes were also noted.

Taking a tension between 18 and 25 mm. of mercury as normal, it was found that holocain had no effect upon the tension, nor upon the size of the pupil. Cocaine causes a slight increase of tension and a marked dilatation of the pupil. Tropocain and acoin resemble holocain, alypin raises the tension, as does eucain B, while stovain and novocain apparently do not. Atropin causes a marked hypertension and a rapid dilatation of the pupil. The action of atropin is more marked if the previous tension is below normal. Eupthalmin increases the tension, while duboisin does not, and scopolamin has but slight effect. Pilocarpin has no effect on the tension of a normal eye, while eserine reduces it slightly. Dionin has no effect, but adrenalin has an immediate reducing effect, especially upon an inflamed eye. It has been found that eserine has much greater effect upon a glaucomatous eye than pilocarpine.—(G. B. T.)

MISCELLANEOUS.

EDITORIAL. **Athletics and candidates for service abroad.** Journal of Tropical Medicine and Hygiene, London, Vol. XVI, No. 2, January 15, 1913.

This editorial deals with the effects of ill-advised athletics upon clerks, chartered accountants, and college students as found by the medical examiner who is called upon to decide whether or not a given individual is physically fit to undertake commercial pursuits abroad in a tropical climate. These applicants are on the average about 22 years of age.

The clerk, as a rule, leaves his school to follow a commercial pursuit at about 17 years of age, and it may be taken for granted that the sports in which he has competed up to this time have left no mark, as they are carried on with other boys of about the same age. The strenuous endeavor to succeed is less evident at this stage, and the effect upon the heart and blood vessels of severe muscular strain passes off quickly in the youthful. When the young man joins a firm as clerk he is cooped up in an office for many hours; his hurried breakfast, lunch while standing at a bar, and a lodging-house supper engender dyspepsia; while the outbursts of athletics on Saturday afternoons and Sundays following a week of little or no exercise give rise, week after week, to alternating overstrain and wasting, which, as the years pass, disclose themselves in chronic dyspepsia, with dilated stomach, and an hypertrophied heart, with rapid and irregular pulse.

The chartered accountant after months of study and training in an office, during which time he sacrifices everything that could promote his health to the passing of the examinations, appears before the medical examiner in a most deplorable condition; and it is diffi-

cult to decide how much of this is due to developmental physical inefficiency and how much to a mere temporary phase of overwork. The author advises that in such cases none should be accepted until he has had a three months' holiday.

The college student who from one cause or another has determined to give up his university for a commercial career ofttimes presents a physique stamped with the ill effects of the "no hat, no overcoat, no umbrella, no underclothing, no lunch, excessive athletic" stage of a young man's life. "His heart is dilated; his pulse quickened; albumin in the urine occurs in 30 per cent of such men; and the temperature at 12 noon is, as a rule, one or two degrees above the normal." The writer states that such men should be refused not only upon physical grounds, but on intellectual grounds as well. "For a man who has not the mental capacity to know how to clothe and feed himself and conserve his energies can not be of much value to any commercial firm, for his grasp of things must be at a low ebb, indeed."

After considerable experience in these matters, the author concludes that if all candidates presenting the single undesirable feature of dilated stomach were rejected, 50 per cent would be lost; that of all presenting themselves only 20 per cent are thoroughly sound physically; and that if elimination were based upon one or two defects, rejection of candidates would be the rule. He further points out that the usual custom of putting down a quickened pulse to nervousness is a mere delusion, "for the pulse of a man with a healthy heart will not increase well-nigh double the rate under the excitement of being examined physically." The rate of the pulse is due to the irregularity of exercise; the heart has lost its balance owing to the alternating excessive and complete absence of exercise.—(J. L. NEILSON, SURGEON, U. S. N.)

HUFNAGEL. **Direct Röntgen pictures without the use of plates.** Münchener Medizinische Wochenschrift, December 3, 1912.

Hufnagel has found that it is possible to obtain perfect X-ray pictures without the use of photographic plates by exposing a highly sensitive bromide of silver paper directly to the Röntgen rays. Such a method has obvious advantages, as it does away with fixation baths and the drying of plates, besides being cheaper and taking much less time.—(J. L. NEILSON, SURGEON, U. S. NAVY.)

REPORTS AND LETTERS.

ACCOUNT OF AN OUTBREAK OF MALARIA ON THE U. S. S. "TACOMA" RESULTANT UPON A VISIT TO TAMPICO, MEXICO.[1]

By J. B. KAUFMAN, Passed Assistant Surgeon, United States Navy.

The *Tacoma* sailed from Bluefields, Nicaragua, for Tampico, Mexico, on October 19, 1912, and reached that port 5 days later, anchoring directly off the city, necessity allowing of no choice in position from a sanitary point of view. Tampico is situated about 6 miles up the Panuco River, which is a narrow stream lined on each side with marshes covered with dense foliage and swarming with mosquitoes, the surrounding country being but slightly elevated and dotted with numerous oil wells.

The town itself has a population of about 25,000, and the writer was informed soon after arrival that it was a hotbed for the most malignant type of malaria; furthermore, that a ship anchored anywhere in the river would be infested with mosquitoes. Therefore prophylaxis in the way of quinine in daily doses of 10 grains was immediately instituted and the entire personnel was required to sleep under mosquito canopies, which were purchased at once. Later the method recommended by Castellani and Chalmers was adopted and 5 grains of quinine were administered daily and 10 grains once a week. It was predicted by the best physicians in Tampico that no manner of prophylaxis would insure immunity; how true their forecast was will appear later in this report.

During the entire stay in this port the writer was constantly prescribing some lotion to counteract the intense itching produced by the bites of mosquitoes, which made their appearance in swarms in the early afternoon and at a time when it was impossible for the crew to seek protection beneath their mosquito bars. Many of these bites became infected, both from the bite per se and by reason of the scratching, and several were quite resistant to treatment.

"After 14 days had passed and no malarial cases had presented themselves for treatment I was naturally sanguine, but on November 8, just 15 days after our arrival, the first case appeared and ad-

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[1] Abstract from annual sanitary report of the U. S. S. *Tacoma* for the year 1912. Received Jan. 9, 1913.

missions continued daily, almost without interruption, until December 6, when there was a temporary abatement; however, on December 12 a new series of cases appeared, and up to the present time (Jan. 1, 1913) there have been 96 cases, 7 being readmissions; 39 of these are of the tertian type (perhaps mixed) and 57 of the more serious aestivo-autumnal type."

As the *Tacoma* left Tampico on November 10, 1912, it will be seen that these cases continued to appear after arrival in Galveston, November 12. The influx of cases was so rapid during the stay there, and this, associated with the fact that there were numerous mosquitoes aboard (the larger part of those examined being anopheles), caused the medical officer to recommend to the commanding officer "the advisability of considering the danger of an infection which would incapacitate the majority of the crew. I expressed the opinion that the ship should be sent to some port where there could be no question of the absence of mosquitoes and at the same time close to a naval hospital, where cases could be immediately transferred in case malarial-bearing mosquitoes remained on board. I felt this necessary because of the large number of mosquitoes present on board while we were in Galveston, although I was never able to definitely determine whether these mosquitoes were brought from Tampico or were reenforced from Galveston. I did demonstrate, however, the presence of mosquitoes in the town of Galveston, as did other officers of this ship, but was not able to procure any for classification."

The total loss to the service in sick days by reason of this malarial infection was 333 days; but when to this number is added that of the men who were discharged from the sick list because of the want of adequate space, the fact that they were practically unfit for duty and were recommended for light work for several days, by reason of their profound weakness, also the further fact that the great majority of the cases were of the malignant aestivo-autumnal type and therefore may mean varying periods of incapacity in the future, the above figures mean but little.

The *Tacoma* sailed from Galveston, Tex., for Boston, Mass., on November 30, 1912, where she was at the date of this report.

Editor's Note.—Since the above report was forwarded the total number of cases admitted for malaria on the *Tacoma* has reached 87. As the need for the services of this vessel was urgent, a board of medical officers was appointed to investigate the situation, and it recommended thorough sulphur-dioxid fumigation immediately and the transfer of all personnel to duty that would not take them to the Tropics in the near future. All members of the crew were transferred to other duty and the vessel held at New York for one month, when subsequent investigation indicated that she was ready for duty in tropical waters. As some of the officer personnel who were infected with malaria remained on board, the result of tropical service upon these individuals is awaited with interest.

SANITARY REPORT ON EXPEDITION TO SANTO DOMINGO.[1]

By S. S. RODMAN, surgeon, United States Navy.

This regiment embarked on the U. S. S. *Prairie* at Philadelphia, Pa., on September 27, 1912, and consisted of 791 officers and men of the Marine Corps, with 5 medical officers and 15 Hospital Corps men of the Navy. Preparations were made and equipment supplied for landing the entire force, but with the exception of the second battalion, which was landed in Caldera Bay for one night, all remained on board during the whole trip.

The percentage of sick for the entire time was 1.4, in spite of rainy tropical weather and great overcrowding.

There were 32 cases of catarrhus epidemicus, 7 bronchitis, 10 tonsillitis, 2 pneumonia, and 2 tuberculosis. Though there were 12 admissions with malaria, all were infected prior to embarking on the *Prairie*. There were 240 liberties at Santo Domingo city, with 81 men taking venereal prophylaxis. No admissions for veneral disease due to exposure here were made, all admissions being traced to exposure prior to sailing from Philadelphia. This good showing is attributed to the fact that all liberty was up at 5.30 p. m., and men exposed to venereal disease took prophylaxis shortly after exposure.

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Though drills were carried on each day and after some weeks an arrangement was made with the Dominican Government whereby two companies could be landed each day for exercise, the personnel began to show the effects of overcrowding, not so much in an increase on the sick list, as by large numbers applying for treatment and the serious aspect assumed by conditions which would ordinarily be trivial. This overcrowding was somewhat relieved by putting one company on board the U. S. S. *Cæsar*.

It was noticed that most of the men had only summer clothes, which resulted in severe exposure to those companies returning to northern ports.

The medical outfit was supplied by the medical supply depot, Brooklyn, N. Y., and was complete and sufficient with a few exceptions. It is recommended, however, that with the possibility of small detachments operating independently, small company outfits be supplied in addition to the usual field hospital equipment. These should be made with the idea of easy transportation by pack animals and kept on hand for immediate issue.

As a result of information received at Santo Domingo city of a fight at Azua between rebel and Federal forces, the *Prairie* proceeded to Caldera Bay on November 23. On that night, under orders from the senior officer present, I landed to investigate the condition of the wounded and to render any possible assistance. With the native doctor in charge I visited some 65 wounded, distributed in three improvised hospitals. Practically none of these men had received surgical attention, and all wounds had on the original dressing applied after the fight, six days previous. In most cases these dressings consisted of a handkerchief or improvised cotton bandages. I was informed by the doctor that some amputations had been performed, but that in all cases, save one arm, the patients had died, as had all head and abdominal cases. No attempt had been made to drain or keep clean the remaining cases. On the following morning I

[1] Abstract of sanitary report, Second Regiment of Marines, U. S. S. *Prairie*. Received Dec. 28, 1912.

was joined by Passed Asst. Surgs. Reeves and Cather. Asst. Surg. Eaton, one hospital steward, and five apprentices with supplies. A field hospital was established in a schoolhouse, and at 10 a. m. we were ready for work. There was a tendency at first on the part of the local authorities to send us only the most severe cases, but by the afternoon we had more than we could do. Practically all of the wounds were inflicted by large soft-end bullets, and, owing to the lack of attention and dressings, all were badly infected and all cases operated were septic. On the morning of the 25th two more hospital apprentices arrived with additional dressings and supplies, and after two days' work it was necessary for the entire party to return on board, as the ship sailed that night for Santo Domingo city. Though most of the more serious cases received attention, it was not possible in the limited time and with the lack of facilities to give surgical aid to all cases. The unused dressings and expendable supplies were left with the native doctor in charge.

Cases operated upon were as follows:

1. Compound fracture, both bones left leg, upper third, through and through drainage, reduction (ether).
2. Compound fracture both femurs, middle thirds. Wounds enlarged, through and through drainage, reduction (chloroform).
3. Amputation right foot—Lisfranc's (chloroform).
4. Amputation left thumb (chloroform).
5. Compound fracture left femur, upper third. Wounds enlarged, through and through drainage, reduction (chloroform).
6. Compound fracture right femur, middle third. Wounds enlarged, through and through drainage, reduction (chloroform).
7. Compound fracture left humerus, upper third. Amputation shoulder joint (chloroform).
8. Abscess left arm. Opened (ether).
9. Compound fracture right femur, lower third, flesh wound above left elbow, perforating wound left thigh, flesh wound left ankle. Through and through drainage both thighs. Wounds opened, fracture reduced (chloroform).
10. Compound fracture tarsal bones right foot. Opened, reduced (chloroform).
11. Compound fracture right tibia, lower third. Wounds opened, through and through drainage, reduced (ether).
12. Gunshot wound right foot. Drainage (chloroform).
13. Compound fracture left tibia and fibula, upper third. Amputation at knee joint (chloroform).
14. Compound fracture left clavicle. Set.
15. Gunshot wound lumbar region. Bullet removed.
16. Perforating wound left chest. Dressed.
17. Perforating wound right chest. Dressed.
18. Perforating wound right thigh and left leg. Dressed.
19. Gunshot wound left foot. Amputation—Chopart (chloroform).

Editor's Note.—The following abstract relative to aid rendered the wounded after the battle at Azua is taken from a letter forwarded to the Bureau of Medicine and Surgery by the Department of State:

As it seemed desirable not only to obtain information as to existing conditions in Azua, but to give surgical assistance to the wounded, the U. S. S. *Prairie* left here on the 23d instant and proceeded thither.

On the two following days Surg. Samuel S. Rodman, Passed Asst. Surg. David C. Cather, Passed Asst. Surg. Isaac S. K. Reeves, and Asst. Surg. William E. Eaton worked over those wounded who were to be found in the buildings used as emergency hospitals and such other wounded as presented themselves.

I am informed that the conditions which they found were horrible; that none of the wounds had been properly dressed, that in many cases gangrene had set in, and that most of the wounds were full of vermin, with the result that many amputations were found necessary. It was stated that at least 30 wounded had died previous to the arrival of the *Prairie* and 43 were found in the so-called hospitals, of whom 2 died before attention could be given them. The people of Azua showed great appreciation of the work of the surgeons. The *Prairie* left Azua on the evening of the 25th instant, the wounds of all the injured having been attended to and it being thereafter only a question of time and care as to whether recovery resulted and it being impossible for the *Prairie* to remain the month or so which would be requisite to insure the proper care which, unfortunately, is not likely to be given.

SANITARY CONDITIONS FOUND IN, AND SURGICAL AID RENDERED TO THE WOUNDED AT, PUERTO PLATA AND MONTE CRISTI, SANTO DOMINGO.[1]

By R. A. Warner, passed assistant surgeon, United States Navy.

On October 26, 1912, the *Yankton*, while lying in East River, N. Y., received orders to prepare for distant service, and on October 30 sailed for Puerto Plata, Santo Domingo.

On our arrival at Puerto Plata, November 5, the town was found to be held by Dominican Government troops and to be surrounded by revolutionary forces. This state of seige had been in effect about 12 days; the food and water supply were in the hands of revolutionists and cut off from the town. American, German, and French merchant vessels, however, brought in supplies on their regular trips, and water was obtained from a few cisterns. Some suffering was occasioned, but there resulted no increased morbidity.

The town has a population of about 6,000 and is healthful and in good sanitary condition. Malaria is endemic, mostly benign, but occasionally malignant. Typhoid fever occurs, but at present there are said to be no cases, though one person has but recently recovered. Mumps occurs and one case was seen walking the streets. Local physicians state that there is a contagious disease among children resembling scarlet fever, but they do not consider it as the true disease, as albuminuria never occurs and it is mild, though highly contagious among children. At present there are no cases known. Dr. Marquina, a local physician of French medical education, stated that he is certain kala-azar occurs in the island, and his description is certainly identical. He also described a disease occurring in negroes, whose wide nostrils permit certain fly larvæ to be deposited therein, causing a condition identical with *Lucilia macellaria* infection. So far he has been unable to show me cases of either disease. They be-

[1] Annual sanitary report of the U. S. S. *Yankton* for the year 1912, received Jan. 20, 1913. Abstracted and condensed.

lieve hookworm infection to be common, but have not instituted any research. There is no variola and yellow fever has not been present for some time.

The streets are guttered and surface drainage is discharged into the harbor, but privies are used extensively.

The regular water supply is from a stream high up on Mount Isabella de Torres, not far away, and is piped in for distribution. During an armistice the water supply was turned on by the revolutionists on November 11, and at the same time food was allowed to enter.

A new hospital building has been erected on high ground just back of the town, an excellent position, but has been used only as a garrison and fort, being constructed of cement. An old shingled building in the low part of the town is used as the Mercedes Hospital. It is supported by Government funds and private subscription. The building is old, dirty, and germ laden, with accommodations for 14 cots in a ward and 5 partitioned rooms for private patients. The operating room contains a good iron table and a few old instruments, but is very dirty. Surgical dressings in small amount, prepared by Johnson & Johnson, are obtained. Iodine fortunately is used on wounds, and in spite of little aftercare they do well. Bad infections are brought in from the country, where wounded receive very crude attention, if any at all.

After a fight about the town on November 17 a request for medical assistance was made from the hospital, and I attended those wounded, continuing to do so for the balance of the stay of the ship. Several cases were found who needed only sequestrotomy to permit their recovery, though they had been long in the hospital. It was necessary to expend aseptic surgical dressings from the ship's supply. The cases treated responded very promptly to treatment, and when the *Yankton* left, December 12, for Monte Cristi all were in a satisfactory healing condition. One case died, being inoperable when received in the hospital. His injury was from a .50-caliber lead bullet which entered the back just above the crest of right ilium and coursed upward and forward, injuring the right kidney and intestines, passing through the liver, and lodging beneath the skin over the seventh rib anteriorly. The cartridges used are of various types—7 mm. modern Mausers, 10 mm. old jacketed Mausers, 11 mm. lead bullets, and 50–70 lead bullets—so that all types of small-arm injuries occured.

On December 12 the *Yankton* left Puerto Plata to take station at Monte Cristi. This town has a population of about 3,000. It is situated about a mile from the shore line, the intervening country being flat and arid and liable to flooding. The streets are not provided with gutters and are not well kept. During rains they become small streams. Water supply is from the Yaqui River and from

cisterns. There is no sewerage. Privies are used, or, on the outskirts, the ground. The health of the inhabitants, however, appears fairly good, there being present no known cases of contagious disease. Malaria is very common.

The hospital is at the southeast corner of the town. It is low frame building sheathed with zinc, plentifully supplied with doors, but no windows, and appears to have been built originally for a warehouse. It is merely a building containing cots. There are two good-sized wards holding folding cots, and two rooms which are used in time of need. One is now said to be an operating room, but contains nothing but two pine-wood tables and no equipment whatever. The place could hold about 40 patients. There are no water connections. On arrival here it was learned that Asst. Surg. Jenkins, of the *Nashville*, had found it necessary to take charge of the hospital and to care and provide for the patients, and this service was continued. The patients numbered about 20, but it was difficult to tell just how many belonged in the hospital, as a variable number frequently appeared. Fourteen were gunshot wounds, and all were septic. Four needed amputations, but would not consent, so that the only operations were incisions for pus or to remove fragments or bullets. The only surgical dressing available in Monte Cristi was a limited amount of absorbent cotton. There is no nursing force, and each man depended on his wife or family for what care he received. Apparently the wives and infants slept on the floor. On December 25 the Dominican ship *Independencia* took off all but five of the patients for transfer to Santo Domingo City.

Tetanus does not occur quite so frequently in the northern part of the island, but apparently often enough for the people to appreciate the need of antitetanic serum. It was the only supply in the hospital at Monte Cristi. The writer was informed that in the southern part of the island the disease is so frequent that no birth occurs without an immunizing dose nor is it safe to allow wounded to go without it. Especially in Santo Domingo City is the number of infections high. In the event of an expeditionary force being put into this country, it would be well to supply antitetanic serum in immunizing doses.

Here in Dominican waters scarcity of fresh provisions is experienced. Beef is obtainable, although tough and of poor quality, but chickens and turkeys are occasionally procured, so that an agreeable change is supplied. There are practically no fresh vegetables to be had, a few onions and small potatoes making up the sum total, but oranges, bananas, and limes are added to the mess frequently. The Dominican bread is occasionally furnished, and is well cooked and wholesome.

MEDICO-MILITARY REPORT ON A CRUISE IN SANTO DOMINGAN WATERS.[1]

By H. E. JENKINS, assistant surgeon, United States Navy.

A large proportion of the time that the *Nashville* was away from the United States in 1912 was spent in Santo Domingan waters, either at Puerta Plata, Monti Cristi, or Santo Domingo city.

Owing to her light draft the vessel was able to enter the Ozama River and anchor off Santo Domingo city, which is about the best anchorage on the island, as it gives the personnel an opportunity to enjoy the pleasures of the river and the privileges of a near-by baseball field, while relieving them of the disagreeable circumstances attendant upon a prolonged anchorage in the open Caribbean Sea. There is one objection, however, for the banks of the river are high enough to shut off most of the breeze, and the resulting heat is markedly felt. The beneficial effects upon the crew of the change from this port to those on the north coast, where a good breeze is found, were most evident. The climatic conditions at all three ports mentioned may be styled good.

During the months of February, March, April, and May a bountiful supply of good water was obtained about 10 miles above Santo Domingo city, on the Ozama River, but was only used for washing purposes.

Monti Cristi is a Spanish town of about 5,000 inhabitants, located on the northern coast of the island, close to the Haitian border. It is situated about 1 mile from the landing upon an undulating plain, partially surrounded, at a distance, by mountain ranges. Considerable low marsh land in the vicinity of the city furnishes mosquitoes in large numbers. Ordinarily the water supply is from the Yaqui River, several miles from the town, but during this visit the waterworks system was out of commission, having been disabled by the revolutionists.

The majority of the houses are built of wood. The wide, unpaved streets are lighted by oil lamps, but not provided with sidewalks; there is no drainage or sewage system, and practically no attention is paid to matters of sanitation. The most prevalent diseases are malaria and tuberculosis, but tetanus is said to be widespread, although no cases were observed. A few cases of leprosy exist. The "hospital" consists of an old storehouse divided into one small and 3 large rooms, is most insanitary and unprovided with facilities for the treatment of the sick.

When the *Nashville* arrived at Monti Cristi on November 24, 1912, the revolutionists were besieging the town and two days later the Government forces surrendered. On the 28th the medical officer

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[1] Abstracted from the annual sanitary report for 1912, U. S. S. *Nashville*. Received Jan. 30, 1913.

took charge of the "hospital" above referred to and continued to care for the patients until the departure of the ship, December 13. The 20 surgical cases found in the hospital were all gunshot wounds resulting from the recent conflicts between the Government and revolutionary forces. In addition, 8 medical cases were cared for, None of the patients had been receiving any attention other than that administered by friends or relatives. The food was limited in quantity and of the worst quality, owing to the several months' siege the town had just undergone. "The condition was one of chaos." Not only were those in the hospital given attention, but others who were wounded and living in the town received aid.

A BRIEF NOTE ON THE CAPE CRUZ-CASILDA SURVEYING EXPEDITION FROM A MEDICAL OFFICER'S POINT OF VIEW.[1]

By E. E. WOODLAND, assistant surgeon, United States Navy.

The surveying season of 1912–13 began with the sailing of the *Paducah* on November 2, 1912, with the Cape Cruz-Casilda surveying expedition on board, consisting of 165 enlisted personnel, 11 officers, 5 hydrographic surveyors, and 10 laborers obtained at Portsmouth, N. H., and Guantanamo, Cuba.

At the latter place barge *No. 1* and barge *No. 123* were added to the expedition. They had been thoroughly painted and freed from insects by use of sulphur fumigation, and were in good condition, and have remained so.

The anchorage of the expedition began at Macarji Point, and then Oltman's Cay, both being considerable distance from shore and among cays not inhabited and covered with undergrowth of mangrove so thick that walking is impossible without cutting through. Mosquitoes and sand flies abound, but they have not annoyed the crew except while on tower parties. They are not considered infectious because of their isolation from habitations.

The base for supplies and mail is Tunas de Zaza, which is 70 miles from the present anchorage and toward which the expedition is working. It is a small place of 400 to 500 people and is located on a sandy beach and almost completely surrounded by marshes of salt water and therefore mosquitoes do not abound. Their drinking water is solely rain stowed in wooden tanks. No fevers of infectious type are found in epidemic form, and the health of the community is good. It has communication by steamer with Cienfuegos, and railroad communication with Sancti Spiritus every second day. No medical facilities exist. Their sanitary conditions are nil; it would

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[1] Annual Sanitary Report of the U. S. S. *Paducah* for the year 1912, received Jan. 18, 1913. Abstracted and condensed.

be an ideal spot for ankylostomiasis, but it is claimed not to exist there.

Sancti Spiritus, 27 miles inland, is a place of 7,000 inhabitants and the real source of supplies, which are shipped by rail to Tunas. There is a good hospital, but the railroad journey is a most trying one. Fresh meat is the only thing obtainable at Tunas, and it is of fair quality, and is killed 12 hours before our arrival. Weekly trips are made to Tunas de Zaza for a period of from 12 to 48 hours, but the crew are not permitted to go ashore. No prostitution exists.

The innovation of liberty for the crew this season every seven to eight weeks for seven days is considered excellent in every respect and tends to contentment both of the crew and officers, as it lessons the monotony of eight months' complete isolation where the work is continuous and hard. Cienfuegos has been selected as the port for liberty. It is a town of 30,000 people and of the typical Spanish type. Every opportunity was given me by the personal guidance of the mayor to observe the sanitary status of the city, and, by the staff, of the hospitals. These latter are two in number; one, the City Hospital, has about 135 beds; the other, the Sanatoria de La Colonia Español, contains 250 beds. This latter institution is new and kept fairly clean, and has an excellent and modern type of operating room. It is built in sections which communicate by inclosed corridors. It is vastly superior to the City Hospital.

There is a sewage system including most of the town. The water supply is obtained from a mountain creek 30 miles from the city and at quite an elevation. From the dam it is conducted by underground aqueduct to reservoirs, from whence it is distributed to the city. Mosquitos are common, but malaria is uncommon, and there has been no yellow fever for some time, although the anophelinæ and stegomyia exist. Typhoid does not exist in epidemic form. Tuberculosis is common. Prostitution is open and licensed by the city, but the prostitutes are inspected 3 times weekly by the city physicians and removed to a special institution until well when found diseased. The experience of our one stay in Cienfuegos argues extremely well for the system. The men were exposed constantly, and up to the present writing (14 days from exposure) not a single case of venereal disease has developed. It must, however, be noted that the men faithfully carried out the venereal prophylaxis.

The crew are composed largely of men of experience in the service, many of whom applied to return to the expedition. They are unusually contented, considering the hard work and exposure. Their physical condition is excellent, as they all get plenty of exercise and sleep on deck in the open air at night. There has been nothing in epidemic form, and all sick days are due to minor ailments. The fact of not having begun shore-line parties yet has resulted in very

little dermatitis due to *Rhus metopium*. All the crew and civilians except three have had typhoid prophylaxis.

MEDICO-MILITARY REPORT ON PORTS OF THE WEST COAST OF CENTRAL AMERICA AND MEXICO.[1]

By C. B. CAMERER, passed assistant surgeon, United States Navy.

CORINTO, NICARAGUA.—This port has been reported upon so frequently heretofore that repetition is deemed unnecessary. During the recent occupation of this Republic by the United States forces, sanitation was effected as thoroughly as circumstances would permit, excellent work being done, viz, collecting and burning garbage, free use of kerosene in pools and stagnant waters, clearing of undergrowth, the prevention of soil pollution, ditching, etc. A sanitary squad was regularly detailed for this work, with a medical officer in charge.

SAN JUAN DEL SUR, NICARAGUA.—This small village, visited frequently by this vessel while on patrol duty, is built on the beach at the foot of high hills, contains about 700 inhabitants, and is constructed wholly of frame or cement buildings. Malaria is less frequent here than in any other Nicaraguan port on this coast. No system for the removal of sewage exists, drainage being effected by ditches and natural means. Sanitary and health conditions are better here than are found in other parts of the country visited, and but little sickness was observed. No opportunity to examine mosquitoes was available. Venereal diseases are present to a lesser extent than elsewhere in this country. Water for drinking purposes is derived from cisterns alone and all those examined were clean and well protected against contamination. The general health may be stated to be good. No hospitals are maintained and there is but one native physician. There is no quarantine station, pratique being granted by the commandante.

MANZANILLO, MEXICO.—The climatic conditions, in so far as available data go, may be expressed as follows:

(*a*) Temperature: From November to April the maximum temperature runs between 28 and 30° C.; minimum between 23 and 25° C. From May to October the maximum ranges from 31 to 34° C., the minimum between 25 and 28° C.

(*b*) Prevailing winds are northwest, north, and south. Velocity of winds in calm weather is from 1 to 16 kilometers per hour; fresh breezes, 16 to 42 kilometers per hour. In the month of September, 1912, a rate of 116 kilometers per hour was recorded at one time.

[1] Abstract from annual sanitary report of the U. S. S. *Denver* for the year 1912. Received Jan. 17, 1913.

(*c*) The rainy season begins in June and ends in November, the dry seasons extends from December to May. The average rainfall is estimated to be at least 60 inches per year, but many years it reaches three times this much. One instance, recorded in 1906, states that 54 inches fell in three days and four nights of continuous rain. Rainfall is reported to be less on the coast than back some 50 to 60 miles inland.

The climate, taken as a whole, is to be considered as very unhealthful, the death rate, both among natives and aliens, being reported as very high.

The town of Manzanillo contains about 900 inhabitants, there being a population of 1,492 reported for the entire district, and is built upon the sides of steep hills that separate the town from the lagoon, to be mentioned at length later. The general type of all buildings is native, material in common use being frame and adobe, but little brick or stone being made use of. There is no sewerage whatever, drainage being effected by natural means alone. There is a daily garbage wagon to collect street and kitchen refuse. This refuse, however, is dumped in a heap about 50 yards back of the town, together with all offal from the local abattoirs, and is very offensive. The principal scavengers, here as elsewhere in this part of the world, are the *sopalotes*. There are but few earth or vault privies in the town. These all overflow during the rainy season, their contents gravitating into the streets. Deposits of excrement upon the ground is customary, and apparently no precautions to prevent this pollution exist.

There is no hospital located here, the nearest accessible one being at Colima, five hours away by rail. This is reported to be an excellent and well-equipped one, with a capacity of about 100 beds, and operated by Sisters of Charity. There was a small hospital established in Manzanillo in 1906 by the " Port works," but it has fallen into disuse and is now occupied as a private residence. There was an attempt made to conduct an isolation hospital some few years ago, frame buildings having been erected and a Clayton apparatus installed, but the entire place has fallen into disuse and neglect; the buildings are not in use and never have been.

The lagoon of brackish water, previously referred to, is about 35 kilometers long, averages 2 in width and about 1 meter in depth. The water is heavily impregnated with phosphorus. During the dry season it contains little or no water and is therefore excessively offensive to the olfactory sense, and forms a colossal breeding place for mosquitoes and flies. Among the former, *Anopheles maculipennis*, *Culex solicitans*, and *Stegomyia calopus* have been observed. Rats are very prevalent and are to be considered as factors in the transmission of certain diseases.

There is no source of potable water in the town, all water for human use being brought from Colima in tank cars, or from Coloma on mule back in skin containers. Rain water is stored in cisterns (all observed were unprotected against contamination). Exact data as to the general health are very difficult to obtain, inasmuch as nine-tenths of all cases of illness or injury are reported as going to Colima for attention. This obviously tends to materially lessen the morbidity and mortality rates for this port. Infant mortality is very high, incident to syphilis, malaria, dysentery, and inanitions; deaths from scorpion bites are stated to be frequent among children. It is stated upon excellent authority that contagious and infectious diseases are not reported by the local authorities as a rule in order to prevent avoidance of this port by shipping, etc. This is most deplorable. A case of leprosy was reported about six months ago, present whereabouts unknown. Bacillary dysentery, typhoid, all forms of malaria (pernicious quite common), pulmonary tuberculosis, and syphilis, the latter excessively prevalent, are present to a great extent. It is stated that 70 per cent of all admissions to hospitals on this coast are suffering from some form of syphilis, either congenital or acquired. It may be stated in conclusion that the health and sanitary conditions as existing in this port are most deplorable.

An average of 350 Chinese immigrants are reported to arrive here every six weeks; vessels bringing them are quarantined for 10 days upon arrival by the port health officer, a Federal official; these Chinamen are to be considered as a possible and very probable means of introducing and spreading various diseases, especially when the laxity of the existing quarantine and sanitary procedures are considered.

There is an acting assistant surgeon of the United States Public Health Service located here for the purpose of examining into vessels bound for United States ports and for the observation of local health conditions, etc.

San Blas, Mexico.—The climatic conditions, in so far as obtainable information permits, may be stated as follows:

The climate, as in Manzanillo, is to be regarded as unhealthful for Europeans or others not acclimated, incident to the heat, excessive rains, and the endemic diseases prevailing.

(*a*) The dry season extends from November to April; the wet from May to October.

(*b*) Rainfall is stated to be about 80 inches annually, but this figure is often exceeded materially.

(*c*) Temperature: Exact data are impossible to obtain, and that herein given are to be considered as more or less unreliable, but approximately the thermometer may be stated to register about 28° C. during the dry season as an average and about 34° C. during the wet.

(*d*) Prevailing winds are stated as follows: North, northwest, south, and southwest. No information as to velocity, etc., was obtainable that could be considered as reliable.

There is no obtainable potable water here, all for human consumption being transported for a distance of over 6 miles on mule back in skins or earthenware containers and is obtained from wells and springs. Rain water is stored in cisterns, but all observed were wholly unprotected against contamination. The water supply as it is is not of good quality and may be a very probable source of infection, as bacillary dysentery, intestinal parasitic diseases, etc., are common.

The town is reported to contain about 2,500 people, and is built on low, flat, and very sandy soil. An *estero* empties into the sea in front of the town, after winding entirely around it, and mud flats of large area are uncovered at low tide. These mud flats extend for a considerable distance into the town proper and afford many shallow pools, which swarm with mosquitoes and gnats. The banks of the *estero* are low and covered with dense vegetation. Buildings are constructed principally of adobe, frame, thatch, and a small amount of brick and stone. Houses and streets are fairly clean and dry, many of the latter being roughly paved. There is no sewerage, all refuse being thrown into the *estero* mentioned. There are but few privies of any type, and deposition on the ground is very evident about buildings and open spaces; this practice seems to be customary and is not regulated. Vermin are very prevalent and a source of great discomfort and are to be considered seriously as a most potent factor in the dissemination of certain classes of diseases. Mosquitoes are general, yet no apparent method of protection against them is to be observed, there being no effort made toward screening houses or sleeping quarters, and as a result malaria is very prevalent among all classes.

There are no hospital facilities and none are to be had nearer than Tepic, over 25 miles distant, the hospital there being reported as fairly well equipped. The food supply is stated to be deficient in quantity and inferior in quality. There is no railway; the roads which are all in poor condition become practically impassable in the rainy season.

The prevailing diseases are reported to be dysentery (both amebic and bacillary), pneumonia, syphilis (excessively high in all forms among all classes), and all forms of malarial infections, the pernicious type being frequently met with and probably often due to poor or insufficient treatment. Typhoid is rare; no epidemics were present at the time of our visit. Infant mortality is excessively high; seven out of eight newly born infants are reported as dying during the first few months.

There is no quarantine station at this port, but there is a port health officer appointed by the Federal Government, an Englishman named Greave (he being the only physician in the field), who boards all vessels and reports health conditions to those in authority. No opportunity presented itself for a study of the types of mosquitoes present, but the *Anopheles maculipennis* and many varieties of *Culex* are reported. *Stegomyia calopus* have been reported, although none were observed by me.

MAZATLAN, MEXICO.—Climatic conditions, in so far as all obtainable data permit, may be stated as follows:

The climate is not to be considered as salubrious. During the summer months excessive heat prevails and the rainfall is less than in other localities north and south, there being a more or less " dry zone " extending in a radius of about 130 miles around this port.

(*a*) The average rainfall is stated to be about 34 inches annually.

(*b*) Prevailing winds are the " trades," north and northwest.

(*c*) Average temperatures, expressed in the Farenheit scale: During the dry season, from 76° to 82° F.; during the wet season, from 94° to 100° F.; temperatures as high as 135° F. have been recorded.

(*d*) The wet season extends from July to October; the dry from October to June 15.

The city of Mazatlan is built on rolling land, affording good drainage; buildings are of Spanish type of architecture, adobe and brick being the principal materials used, with stone and timber employed to a lesser extent. The streets are in the main roughly cobblestoned and most of them are provided with excellent cement sidewalks. All streets and open spaces observed were fairly clean, although considerable refuse was found in the former at times. Garbage is collected daily and emptied into the sea. An excellent and satisfactory sewage system is in operation, draining into the sea well below low-water mark. Sanitation of buildings and habitations is enforced by the health authorities. Excellent potable water is obtained from a stream 20 miles inland, at Penuhuca, where the intake is filtered through sand, then through a patent filter (settling basins), conveyed to the city through iron pipes, and again filtered before distribution through the city mains. The population of Mazatlan is reported to be 22,000. Extensive plans for street improvement are projected. There are two hospitals, a lazaretto, and two private sanitaria. I personally visited the two former, known as the " Hospital Municipal " and " Hospital Militar," respectively. The Municipal Hospital, a free institution maintained by the city, has a capacity of 100 beds. Different classes of cases are kept segregated, and there is an annex for the care of insane patients. It is but fairly well equipped and is not kept very clean, both wards and inmates showing neglect

in this respect. Operating facilities are very poor, a dearth of necessary instruments and appliances being noticeable. The venereal patients are kept in a detached ward, as are cases of tuberculosis. Male patients are kept separated from female. A detached and well-stocked dispensary is maintained. The separate post-mortem building is poorly equipped. But little, if any, laboratory work is done. The military hospital, also known as the "Improvisorio," is poorly equipped and contains 30 beds. Operating facilities are meager. The principal admissions are stated to be for venereal affections. It is maintained by the Federal Government, a medical officer with the rank of lieutenant colonel being in command. He has two assistants, both medical officers, and all attendants are stated to be civilians. The lazaretto, for the care of quarantinable cases, is located on an island behind the city, and consists of a number of detached wooden buildings. Rigid quarantine measures are enforced. The institution is fitted with a disinfecting apparatus, presumably a Clayton SO_2, and is maintained by the city. The two sanitaria mentioned are private institutions and would be available for military use in case necessity arose for their occupancy. They are both stated to be fairly well equipped and to have a capacity of about 10 beds each.

The general health of the city may be stated to be fairly good. Malaria is endemic, as in other near-by ports, but not so much so as elsewhere. Tertian and aestivoautumnal forms are most frequently met with. There is but little typhoid; pulmonary tuberculosis is prevalent; bacillary dysentery is found to a considerable extent. Venereal diseases are not so prevalent as elsewhere in western Mexican ports. Houses of prostitution are licensed by the Government, and inmates are subjected to weekly examinations by a medical officer, those found to be infected being treated in the municipal hospital.

There was a mild outbreak of bubonic plague reported here about six years ago. Rats were exterminated at that time, and this work is still kept up. Infant mortality is quite high, deaths being usually attributed to gastrointestinal diseases and malnutrition. Mosquitoes are very numerous during the rainy season, different varieties of anopheles and culex being the most common types found. Stegomyia have not been observed for over eight years.

A municipal board of health is maintained. All shipping is inspected by the port health officer, quarantine is effective, and regulations are rigidly enforced.

Altata, Mexico.—But little information bearing on climatic conditions as existing in this port could be obtained, but the climate is stated to be practically the same in all respects as that of Mazatlan, with the possible exception of more intense heat during the summer months, due to the town's location on sand dunes and the dearth of protecting shade, etc. The average rainfall is stated to be less than

30 inches annually. The source of this information, however, is not to be accepted as absolutely authentic, but may be considered as a fair approximation only. The prevailing winds are from the north and northwest. Violent sand storms are frequent and are a source of great discomfort to the inhabitants.

The town is located at the extreme end of a lagoon of shallow water and is built in an irregular manner on the sandy beach. The houses are all, with a single exception, built of thatch and wattles, plastered over with mud. The exception referred to is the frame residence of the railroad agent. There is no drainage except by natural means, and apparently no sanitary precautions are taken in regard to the disposal of refuse and excreta. But few privies are in evidence and the use of the ground is general. There is no obtainable potable water. Fresh water may be struck at a depth of 2 to 3 meters, but is deficient in quantity and soon becomes brackish. All water for human consumption is obtained from the Rio Lemonia, about 18 miles distant, and is conveyed to Altata by tank cars on the railroad. This water is stated to be of poor quality. There is no health officer here and no hospital facilities, the nearest hospital being located at Culiacan, 34 miles distant, trains leaving Altata for that place every other day. Mortality is stated to be high, due principally to malaria and gastrointestinal affections, the wretched food supply being responsible for a great part of the latter class, as all is brought in, nothing being raised nearer than 5 leagues, due to the character of the soil. The only procurable food at Altata is that furnished by the sea.

Vermin are plentiful, especially fleas, the latter being present in enormous numbers. General health is poor, and several cases of malaria were noted by the writer, one especially bad. The population of this port is stated to be 302, and from a rough estimate there appear to be about 75 houses of all sorts in the town. Mosquitos are very numerous, although none were personally observed, due to lack of opportunity. Venereal infection is low, but this information can not be taken as very reliable.

There is no quarantine station nor medical officer nor physician, and, taken as a whole, the town is to be regarded as very unhealthful and insanitary, as apparently no sanitary precautions of any kind are taken.

Topolobampo, Mexico.—All climatic and other data, in so far as was procurable at the time of our visit to this port, is herewith submitted, climatic conditions being taken up first:

(*a*) The climate is salubrious, extremes of temperature are rare, and the atmosphere dry and bracing, the latter being especially grateful to persons affected with pulmonary complaints.

(b) The average rainfall is but from 12 to 14 inches annually, and occurs during the summer months.

(c) Average temperatures as given are but approximations, and are expressed in the Fahrenheit scale: During the summer months, June to September, 90 to 96° F.; during the winter months, September to May, 78 to 84° F. A slight frost occurred in December, 1911.

(d) The prevailing winds are from the south and southwest. Storms are rare.

The town of Topolobampo is stated to contain a population estimated at about 500, but this figure fluctuates from time to time, according to work on the railroad, etc. But four Americans reside here. Buildings are constructed principally of frame and are irregularly scattered over the slopes of steep hillsides which exhibit frequent outcroppings of stone. Drainage is wholly by natural means and into the bay by gravity. The soil is rocky and vegetation is scanty. Low, flat land and salt marshes lie immediately behind the high hills that separate them from the town. There is no sewerage, few vault privies are in use, night soil is very prevalent and a great nuisance, as well as a grave menace to health. No potable water is obtainable, all for human consumption being brought in from San Blas, 62 kilometers distant, in tank cars. This water is taken from a river and is not filtered, but is stated to be of good quality. This is hardly probable.

There is no hospital, and the nearest one is at Guaymas, 12 hours away by rail. It is owned and operated by the Southern Pacific Railroad Co., and reported to be well equipped, with a capacity of about 100 beds.

The general health is reported as good, but little malaria is to be found, and typhoid is rare. A few cases of pulmonary tuberculosis are present; gastro-intestinal affections are rare. Syphilis is very prevalent; 70 per cent of the natives are stated to be affected with this disease, in both congenital and acquired forms. Other venereal diseases are numerous. The death rate for both infants and adults is low.

Mosquitoes are rare and none were seen by the writer at any time. Fleas and ticks are very numerous. There is a port health officer, Dr. R. E. Davis, who boards all shipping and enforces quarantine regulations. He is also company surgeon for the Kansas City, Mexico & Orient Railroad, the Pacific terminus of which line is at this point.

Guaymas, Mexico.—All available information relative to climatic and sanitary conditions is herewith submitted, climatic conditions being considered first.

(a) This port is subjected to intense heat during the summer months, temperatures of 120° F. and over being frequently recorded;

but with this exception the climate may be considered salubrious. The atmosphere is very dry, surrounding land near the city being arid and vegetation scant.

(*b*) The summer months are June, July, and August, the remainder of the year being considered as winter.

(*c*) Average approximate temperatures for summer, 96° to 100° F.

(*d*) Average approximate temperatures for winter, 74° to 80° F.

(*e*) The average rainfall is slight, but 2 to 3 inches per year. Heavy dews are frequently precipitated.

(*f*) Prevailing winds are stated to be south and southwest, and storms are rare.

The city of Guaymas has an estimated population of about 8,000, of which about 300 are Americans and about 1,000 are Chinese.

The city is built on low, flat land with a background of high and rugged hills. The buildings are well constructed, being principally of brick and stone covered with adobe. The streets are broad and comparatively clean. Garbage is collected daily and emptied into the bay. There is a good sewage system, which has proven satisfactory in all respects. Excellent cement sidewalks are to be found in all principal streets. Water for human consumption is principally derived from a reservoir located 3 miles inland. This water is distributed to the city through iron pipes and is not filtered. It is not of good quality and contains a high percentage of calcium salts. Other sources of supply are from Empalma, water from here being of excellent quality and brought to Guaymas in tank cars. Well water is too brackish for drinking purposes.

The general health is stated to be good and the death rate low, but the latter is said to be high for infants during the summer, due to gastro-intestinal troubles and inanition. But little malaria is present; both amebic and bacillary dysenteries are prevalent. Typhoid is rare. Pulmonary tuberculosis is present to a slight extent. Venereal diseases are very prevalent, syphilis being distressingly so. All houses of prostitution are licensed and inmates are subjected to weekly examinations by a municipal physician, all infected cases being treated in the municipal hospital.

There are three hospitals located in Guaymas, viz:

(*a*) Hospital Militar, used as an infirmary; capacity, 30 beds; maintained by the Government and operated by army medical officers. It is reported to be meagerly equipped in all respects.

(*b*) Hospital Municipal, maintained by the city; capacity, 75 beds, 50 being provided for males and 25 being reserved for females. This institution is but fairly equipped and operating facilities are poor.

(*c*) The Southern Pacific Railroad maintains a well-equipped hospital for the care of company employees. The staff are all Ameri-

cans. Operating facilities are stated to be good. Capacity, about 100 beds.

There is a port health officer who boards all shipping and enforces quarantine regulations. Provision is made for the care of infectious cases on an island in the bay. There were no epidemics here during our visit to this port, but smallpox was reported as present inland. Mosquitoes, gnats, ticks, and fleas are numerous. *Anopheles maculipennis* are to be found and *Stegomyia calopus* have been reported in the past. Many houses are fitted with screens, but no other precautionary measure was observed to be in use.

La Paz, Mexico.—As this vessel remained off La Paz but a few hours, anchored 7 miles out, and as no intercourse was held with the shore excepting an official visit from the governor, few data could be obtained. The port health officer stated that health conditions were good and that there were no epidemics present at the time. Quarantine regulations appear to be good and well carried out.

Inasmuch as it is my understanding that information of any sort that may be of interest from a medical standpoint in regard to Mexican ports on this coast is very meager, all possible data that could be procured in the short spaces of time available have been obtained and are herewith submitted.

NOTE UPON TEMPERATURE OF FILIPINO APPLICANTS FOR ENLISTMENT.[1]

By Allan E. Peck, surgeon, United States Navy.

There were 103 examinations for enlistment with 65 rejections and 18 reenlistments. Nearly all the candidates for mess attendants were found to run a slight temperature and were not rejected on this account, as the abnormality appears to be corrected after a period of hygienic living on board ship. The fact, however, may have some sanitary import and an attempt will be made to find the cause.

[1] Abstract from monthly sanitary report for October, 1912, from United States naval station, Cavite, P. I.

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UNDER THE SUPERVISION OF

SURGEON GENERAL C. F. STOKES
U. S. NAVY

EDITED BY

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TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

C. F. STOKES,
Surgeon General, U. S. N.

U. S. NAVAL MEDICAL BULLETIN.

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SPECIAL ARTICLES.

WEAK FOOT.

By R. C. HOLCOMB, surgeon, United States Navy.

Weak foot, commonly called pes planus, flat foot, and splay foot, is a frequent cause for rejection of applicants for enlistment in the Army and Navy. The condition is of sufficient importance for a careful examination into the subject with a view to determining its full significance, not only as a cause for rejection among applicants for enlistment but also as a cause of disability.

The following table, compiled from reports of the Surgeon General of the Army, shows the ratio of rejections per 1,000 applicants for enlistment among white and colored troops.

Year.	Number of applicants.	Place in order of numbers rejected.	Rejections per 1,000.		Total ratio per 1,000.
			White.	Colored.	
1904	33,213	....	....	....	4.16
1905	33,201	22	10.89	18.98	11.22
1906	28,505	19	13.37	21.25	13.87
1907	25,019	15	18.75	28.17	18.97
1908	33,864	8	44.78	74.07	46.30
1909	54,885	5	57.75	64.68	57.96
1910	23,520	6	58.76	116.50	60.70
1911	25,133	6	38.78	84.34	40.37

The above table does not show a consistent proportion from year to year of weak foot as a cause for rejection. For 1909–1910 and 1911 it was fifth or sixth in importance as a cause for rejection, and the total ratio stood all the way from 40 to 60 rejections per 1,000. The statistics are noteworthy in showing the more frequent occurrence of flat foot in the negro race.

The Navy statistics for weak foot or flat foot as a cause for rejection are not available before 1912. For this year, however, out of a total of 78,180 applicants for enlistment 4,534, or 57.99 per 1,000, were rejected on account of flat foot.

The term flat foot so commonly used is unfortunate, as it carries with it the impression that the true disability is the absence of a

high arch, or the flatness of the bearing surface of the foot. Both of these conditions, conditions upon which a good deal of stress has been wrongly placed, are misleading in considering the real disability, which is really a weakness of the foot structure, terminating in a deformity. The term flat foot is used in this article instead of weak foot, which term is preferred, to conform with service statistics, in which the term pes planus or flat foot is used.

It is impossible to get a clear idea of weak foot without an understanding of the arch of the foot and the structures concerned in the tying or buttressing of the arch.

If man should set about the construction of an arch, one stone near the top would form a wedge or keystone locking the arch; but the arch would spread and fall down of its own weight were it not

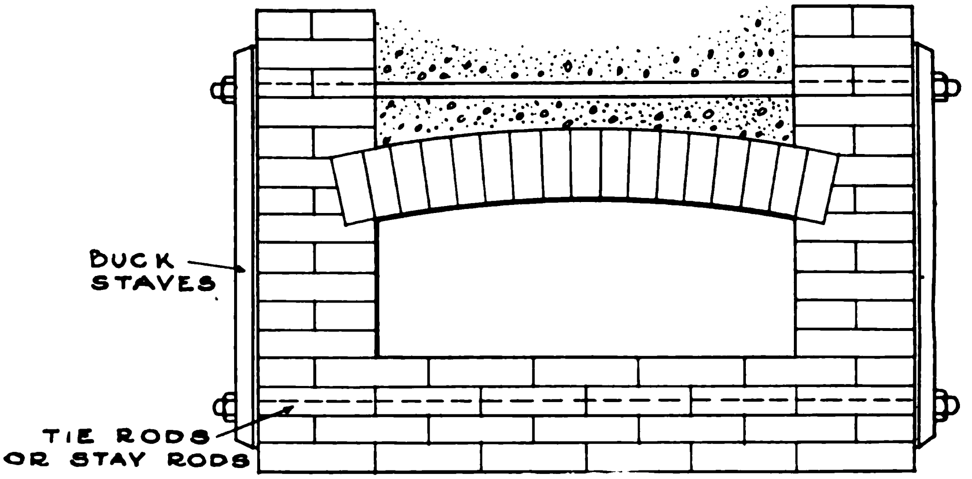

FIG. I.

buttressed by the walls of the surrounding masonry, or, as in the case of an oven arch or similar arch, held into place by buck staves and stay rods (Fig. I).

So, in considering the anatomy of the foot as an arch, it is well to bear in mind the structures which go to make up the arch and its keystone, and the ligaments, tendons, muscles, or other structures which constitute, as it were, the stay rods which support the arch and keep it from collapsing of its own weight.

The weight of the body at rest is exerted mainly on the keystone of the arch, the astragalus, and from this point it is distributed to three bony points on the sole of the foot. These bony points are shown in Figure II, (a), (b), (c). A dissection of the foot shows these points to be the metatarsal bone of the great toe, the calcaneum, and the base of the metatarsal bone of the little toe.

The imprint of the sole of the normal foot shows the lack of any impression along the internal surface, and it is over this point that

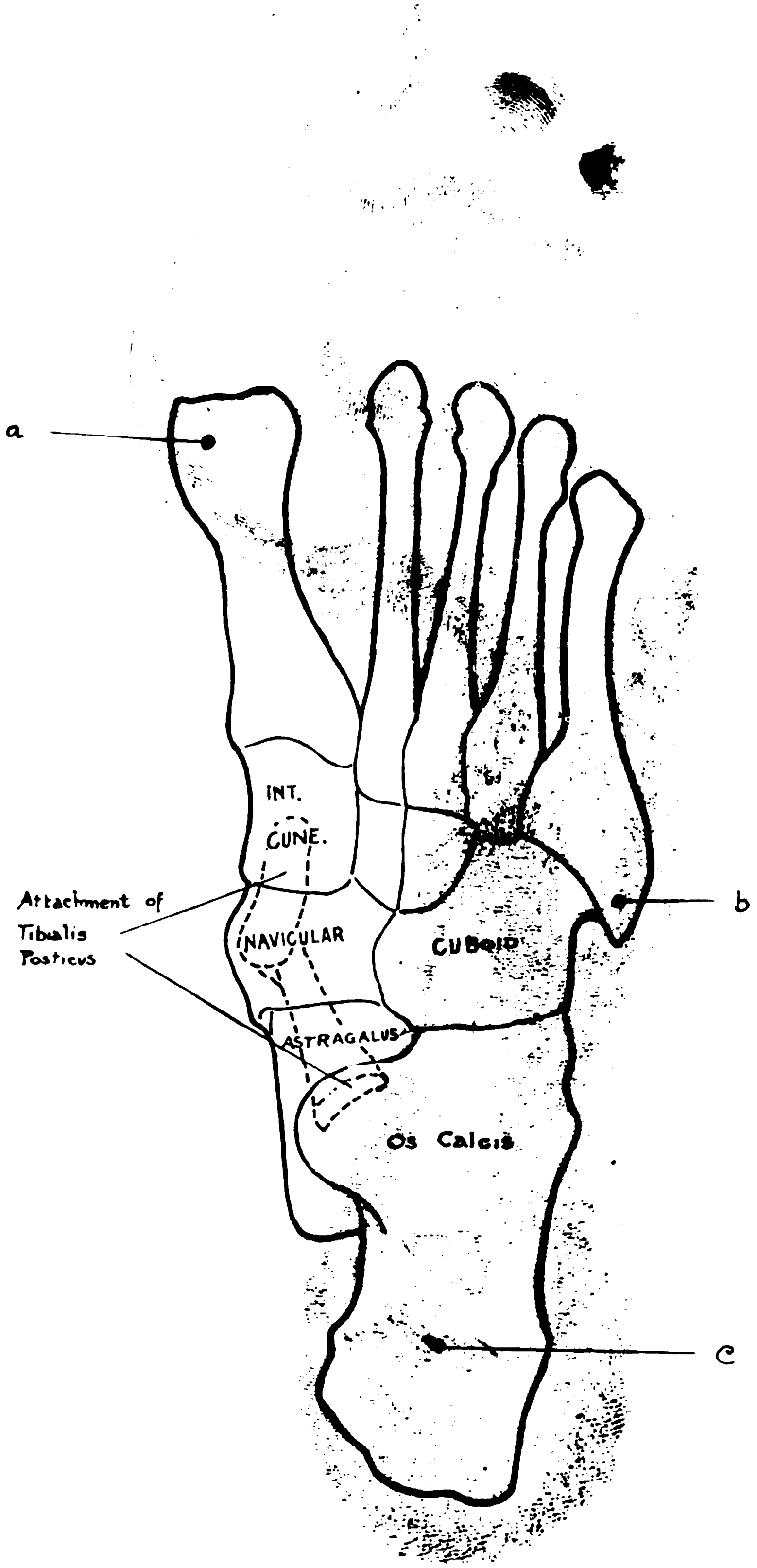

FIGURE 11.—(a), (b), (c) ARE THE LOWEST BONY POINTS OF THE FOOT. THE IMPRINT OF THE SOLE OF THE FOOT FOLLOWS THE COURSE OF THESE THREE POINTS. THE ATTACHMENT OF THE TIBIALIS POSTICUS BRIDGING THE UNDER SURFACE OF THE ASTRAGALUS IS SHOWN.

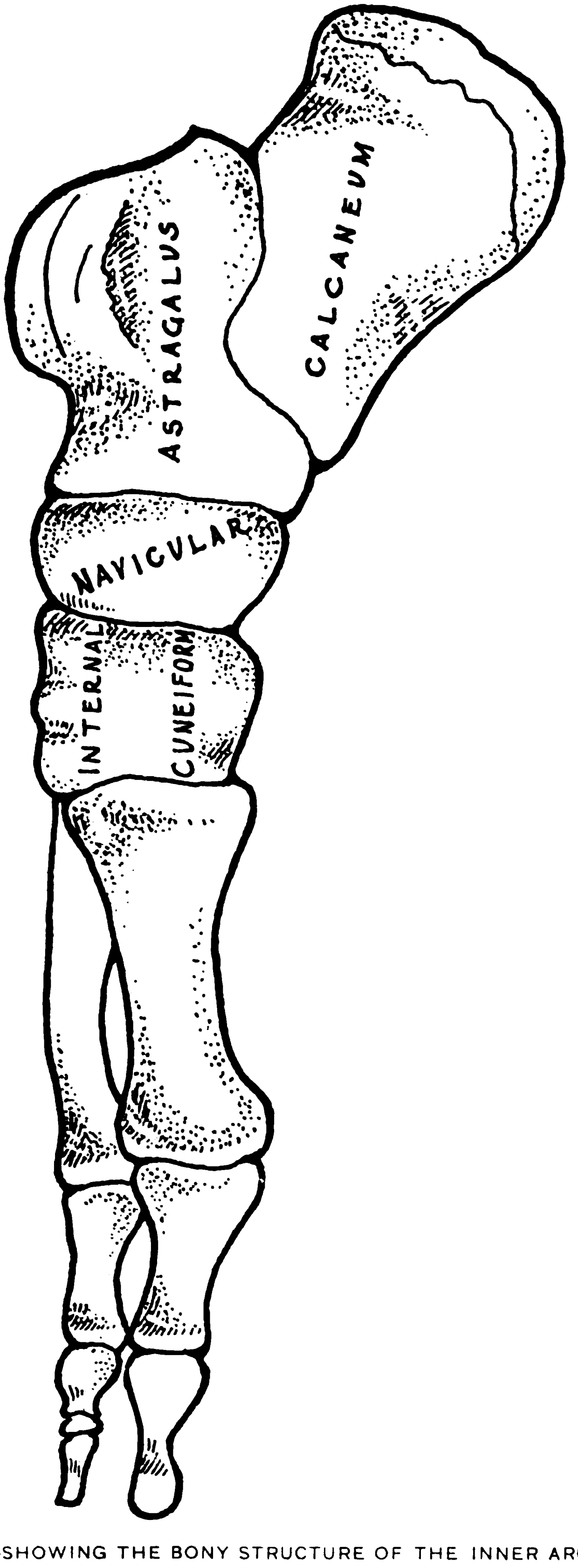

FIGURE III.—SHOWING THE BONY STRUCTURE OF THE INNER ARCH OF THE FOOT. (SEE ALSO FIGURE XI.)

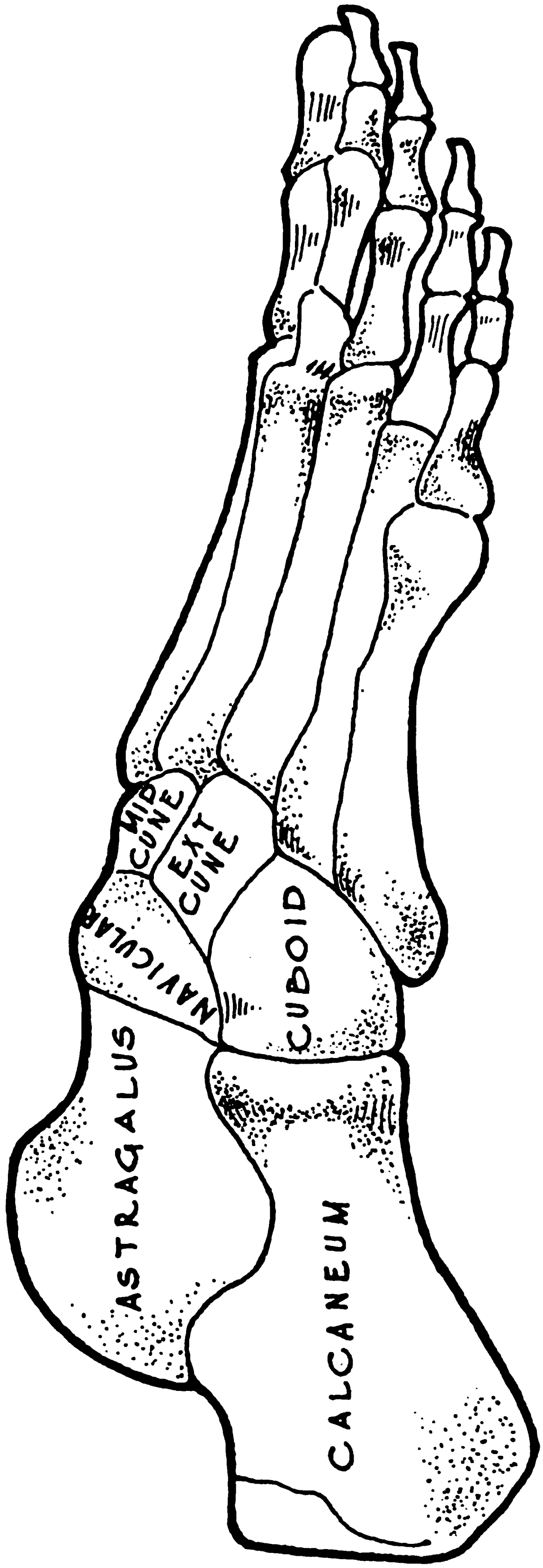

FIGURE V.—THE OUTER ARCH OF THE FOOT. THE HIGHEST POINT OF THIS ARCH IS THE ARTICULATION BETWEEN THE CALCANEUM AND THE CUBOID. (SEE ALSO FIGURE XIII.)

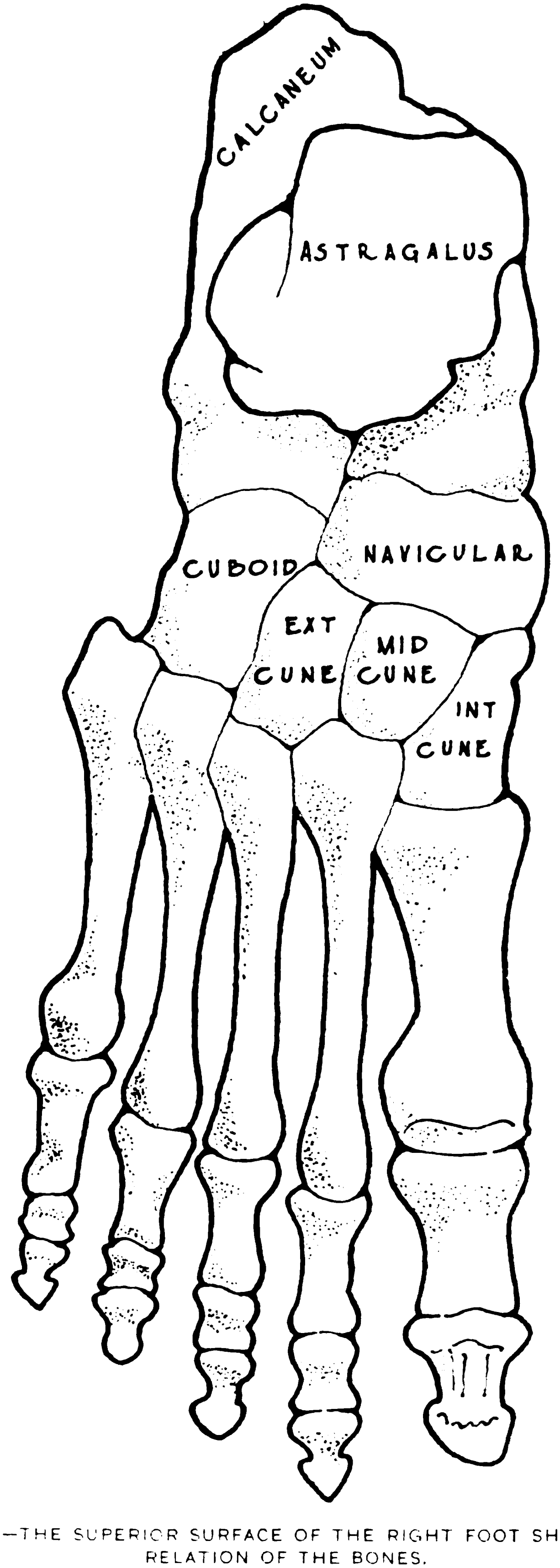

FIGURE VII.—THE SUPERIOR SURFACE OF THE RIGHT FOOT SHOWING THE RELATION OF THE BONES.

we find the height of the tented arch. It is over this point (see Fig. II) that the weight falls, but due to the tented arch it is thrown toward the three points of support.

Referring to Figure III we have depicted the inner arch of the foot extending in an antero-posterior direction. A cast of this arch is shown in Figure IV, the height of the arch being at the astragalo-navicular articulation.

Figure V shows the external or outer bony arch of the foot. It may thus be seen that if the right and the left foot were placed close

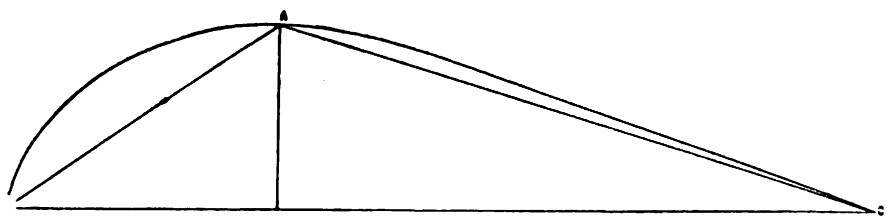

Fig. IV.—Longitudinal section of the cast of the arch at point (A) in Figure VI. (A), the astragalo-navicular junction; (B), the internal tuberosity of the os calcis; (C), the head of the first metatarsal bone. The sharp descent indicates the heel as well adapted for weight bearing; the anterior, long descent, while less strong, insures elasticity to prevent jar and give spring. (After Whitman.)

together the high internal arches would produce a cast similar to Figure VI, in which it is clearly shown that the height of the inner arch is on the internal surface and this arch is formed by the calcaneum, astragalus, navicular, and the cuneiform bones.

The keystone of the arch is the astragalus. The astragalus articulates with the navicular on the one hand and with the calcaneum on the other. A glance at Figure VII will show the relation of these bones to the astragalus, which by its surface may be seen to occupy in the main the internal aspect of the foot.

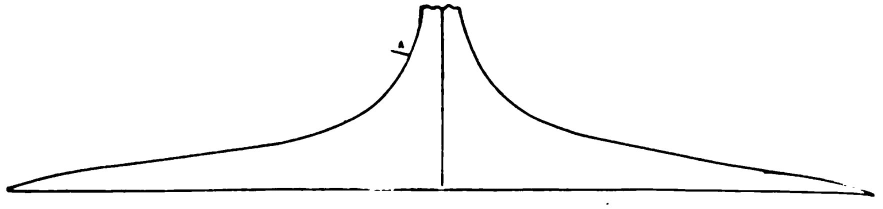

Fig. VI.—Cross section of the arches of the apposed feet. (A), the internal and inferior surface of the astragalo-navicular junction. (After Whitman.)

If the astragalus should be removed as is shown in Figure VIII, the articular surface of the calcaneum and the sustentaculum tali on the one hand, and the facet for the head of the astragalus on the navicular, on the other, are shown, and the wedge shaped gap bridged by the strong inferior calcaneo-navicular ligament. A careful study of this point, bridged as it is by this ligament, and also the attachment of the tibialis posticus muscle (Fig. II), will show that a weakening of these structures would result in an outward bend, or

splay of the foot, and it is just this result which leads to that later deformity and outward bend of the foot which gives the deformity the name splay foot, with the resulting changes in gait and the limitation of the power of adduction.

The height of the arch of the foot does not of necessity indicate a degree of weakness. It is a well known fact that with the savage races, or those not bred to the shoe, the average arch is low, but is not accompanied with a weakness of the foot; and the gait, far from being attended by any splay of the foot, is more often accompanied by an inturning of the toes, or the gait sometimes called pigeon-toed. With the negro, a near savage race in the sense that they have not long been bred to the shoe, the occurrence of flat foot is notorious and is well illustrated by the foregoing statistics, but this kind of a flat foot does not of necessity indicate a weak foot.

The principal ligaments concerned in the support of the inner arch of the foot are the calcaneo-navicular, the interosseous, and the deltoid. It is upon these ligaments, when the foot is adducted or in the attitude of rest, that a large degree of the weight of the body falls. The muscles then being relaxed, the full task falls upon the ligaments.

The muscles and their function in supporting the arch can be best understood by considering both feet together. We have now five arches to consider: The two high inner arches of both feet, which may be studied in connection with Figures II, III, IV, VII, VIII, and XI; the two low outer arches, which may be seen in Figures V and XIII; and the transverse arch, which is made by the two opposed feet, and is shown in Figure VI. In each of these arches the astragalus, upon which rests the weight of the leg, is the center of interest. In dorsal and plantar flexion this bone moves on the leg, between the two malleoli. In abduction and adduction it is fixed between the malleoli and the foot moves upon it. The astragalus has no muscular attachment. Considering these arches, it may be seen that the elasticity of the foot must depend upon equal distribution of weight to all points. The short turn of the inner arch toward the heel is the best adapted to taking weight. The long anterior descent of the inner arch will give elasticity and spring, and prevent jar. It is upon this point that we throw the weight in running and in going downstairs. (See Fig. IV.) The weight, however, is thrown toward this arch by the support of the transverse arch. Both of these main lines of force, longitudinal and transverse, have for their arch keystone the astragalus. Upon the development of the muscles of the leg depend in a great measure the strength and uses of these arches. The strongest of the plantar flexors are the gastrocnemius and soleus. The most powerful adductor is the tibialis posticus. (See Fig. II.) This muscle, and the flexor longus hallucis, which

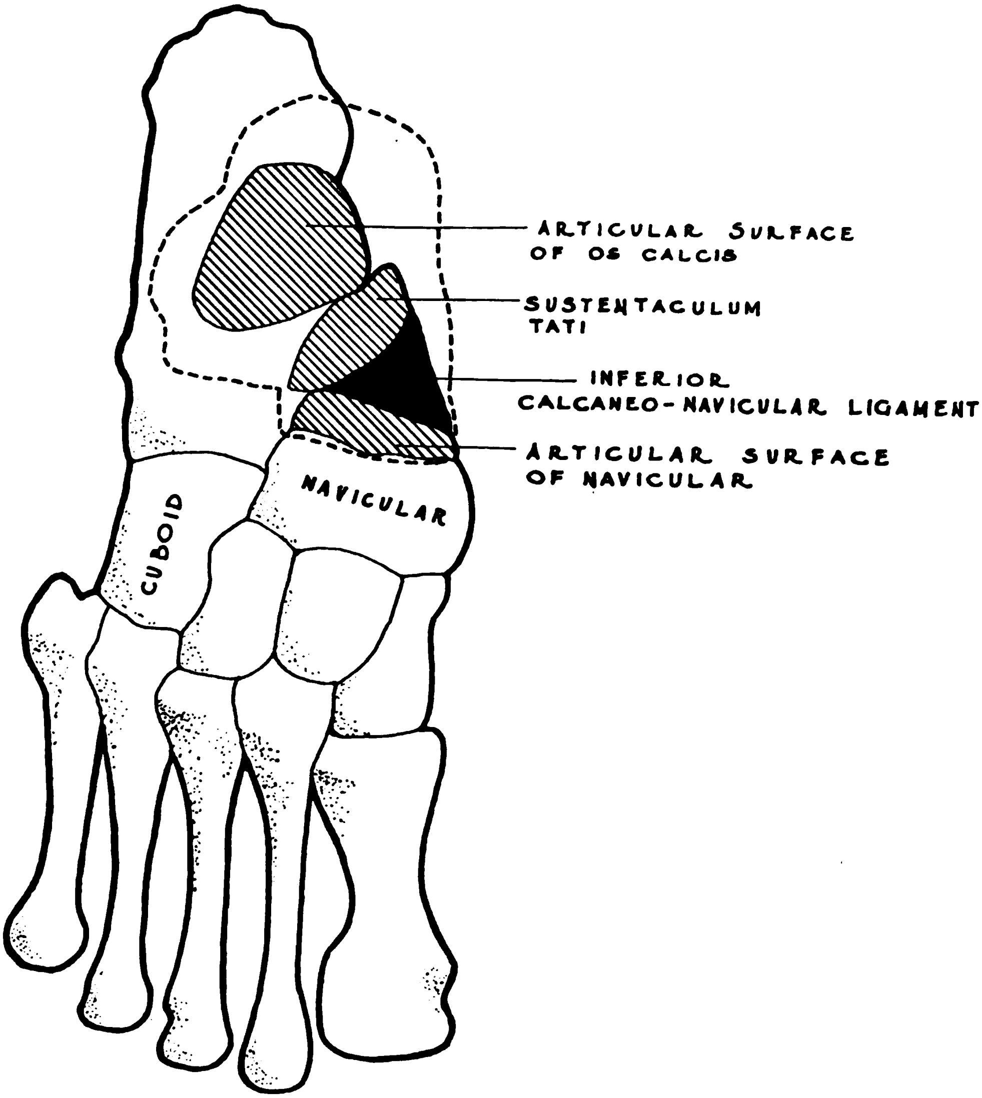

FIGURE VIII.—RIGHT FOOT VIEWED FROM ABOVE. SHOWING THE ARTICULAR SURFACES FOR THE ASTRAGALUS, WHICH LATTER BONE IS OUTLINED WITH THE DOTTED LINE. THE INFERIOR CALCANEO-NAVICULAR LIGAMENT IS THE STRONGEST STAY ROD OF THE ARCH OF THE FOOT.

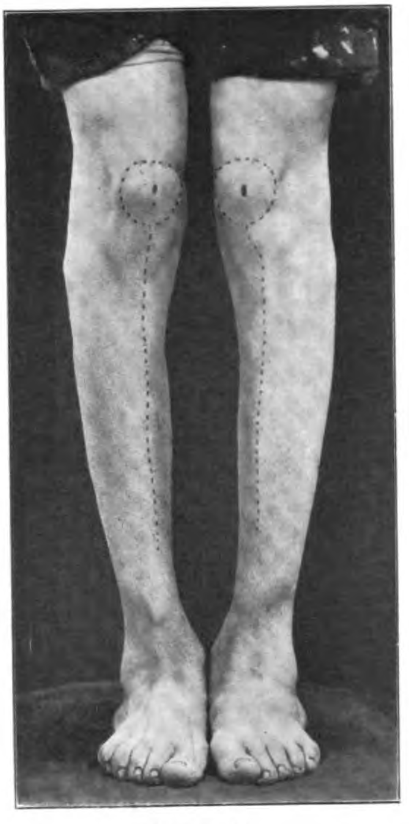

Figure IX.

Figure X.

(AFTER WHITMAN.)

passes directly below the sustentaculum tali, are powerful supports to the weak part of the foot, which is the inner arch. The tibialis anticus with its attachment on the dorsal surface of the foot in action assists in the support of the arch from above.

From what already has been described it should be easy to understand the character of dislocation of the astragalus that takes place from the weakening of the tie structures of the arch. The astragalus sinking into the widening wedge-shaped gap (see Fig. VIII) rotates inward, and as it sinks the structures of the foot thus spread farther apart, take the position of abduction or pronation, and the weight of the body when standing falls along the inner border of the foot toward which point the astragalus is rotating. It may thus be seen that the real underlying condition is a weakness of the fabric of the foot and this weakness leads in its later stages to a deformity due to the slow dislocation of the astragalus from its normal articulation, with a resulting depression or flatness of both the longitudinal and transverse arches, splay of the foot, and a loss of the power of adduction.

DIAGNOSIS OF WEAK FOOT.

Bearing in mind the normally low arch in savage races, the diagnosis of weak foot must be judged not alone by the appearance of the foot, but largely from its function. The main symptoms as pointed out by Whitman [1] group under the following heads:

1. Attitude.
2. Distribution of weight and strain.
3. Contour.
4. Height of arch.
5. Bearing surface.
6. Range of motion.
7. Pain.

Attitude.—(*a*) The heel walk; (*b*) exaggerated turning out of the foot. These two symptoms are not of necessity early symptoms. The cause of the heel walk with its tendency to take the weight off the arch of the foot is not alone the result of the weakness, but also an effort to ease the arch. The exaggerated turning out of the foot needs little comment. We have already seen how a weakness of the structures which tie the arch would result in the sinking of the astragalus and its wedging more deeply between the articular surface of the calcaneum and navicular, thus turning the anterior structure outward. There is also an effort of the individual to ease the inner arch by throwing as much weight as possible on the outer arch of the foot.

[1] Orthopedic surgery.

Distribution of Weight and Strain.—

(*a*) Examine shoe.

(1) Observe signs of bulging inward at the arch.

(2) Observe wearing away of the inner sole of the shoe.

(*b*) Compare the shoe with the bare foot.

The wearing of the heel and sole of the shoe, and the misshape, a result of strain on the uppers, are valuable bits of evidence which will show in a good measure the strength or weakness of the foot that has been encased within the shoe.

Contour.—With the applicant standing, observe the feet placed side by side, the two internal malleoli and the metatarso phalangeal joints touching. In normal feet a slight interval remains between them, due to the concavity along the inner borders. In weak feet the concavity is replaced by a convexity and an attempt at adduction is accompanied by an inturning of the patellæ and crests of the tibia (see Fig. IX and X). According to Whitman, "this change in contour is the earliest and sometimes the only evidence of weakness."

Height of the Arch.—The height of the arch is measured as the distance from a line drawn (Fig. XI) between (*a*) the lower border of the internal malleolus and (*b*) the lower tubercle on the head of the first metatarsal, to (*c*) the tubercle of the scaphoid, which distance should not exceed one-half inch.

Elmore (U. S. Naval Medical Bulletin, vol. 7, p. 102) describes the manner of taking the measurement as follows: The candidate is required to run and the rigidity of the arch noted, also the tendency of the foot to evert at the medio-tarsal articulation; the candidate is then made to stand on a chair having a perfectly flat level surface with the weight evenly distributed on both feet; a flexible celluloid rule (see Fig. XII) is used and the distance from the Feiss line (see Fig. XI) noted and recorded in eighths of an inch.

Elmore's statistics, covering 200 cases show that 5 per cent of the cases examined had a depression of more than one-half inch.

Weak foot may, however, occur in cases inside Elmore's limits. In the only two cases of the 1912 series in which mention of the depression of the scaphoid tubercle is mentioned it was three-eighths inch in one case and one-half inch in the other. (*Vide infra* case L. O.)

Bearing Surface.—An imprint taken with the finger-print apparatus will show the shape of the bearing surface of the foot (see Fig. II.) While this may, when present in a normal degree, serve to assist in forming an opinion, on the other hand if the imprint is flat, in the absence of other symptoms it would not be sufficient to warrant a diagnosis of weak foot. The fatty pad under the arch which is normally present in the young, the highly developed plantar muscles in

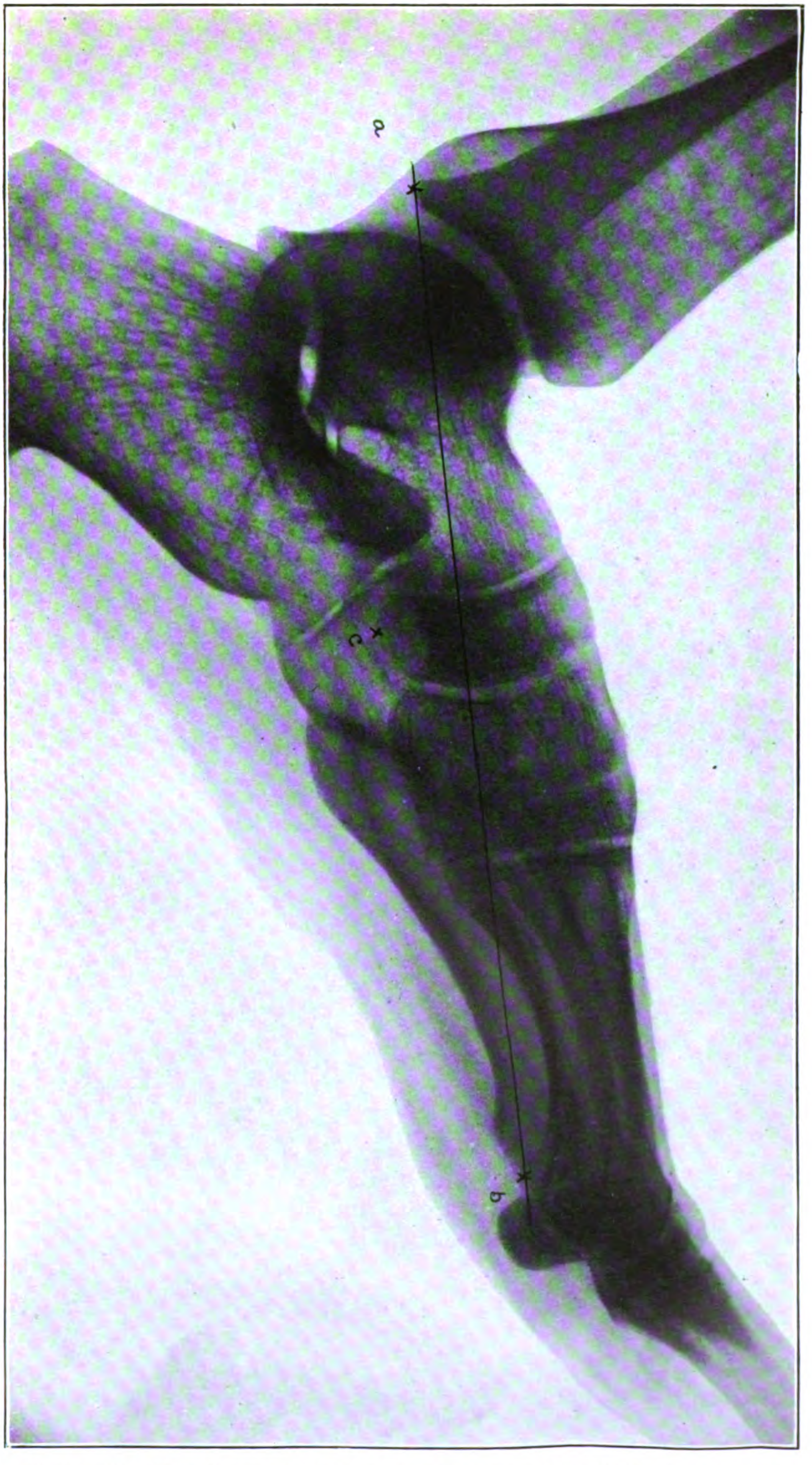

FIGURE XI.—SHOWING THE FEISS LINE FROM (a), THE LOWER BORDER OF THE INTERNAL MALLEOLUS, TO (b), THE LOWER TUBERCLE ON THE HEAD OF THE FIRST METACARPUS. THE TUBERCLE OF THE SCAPHOID IS INDICATED AS (c).

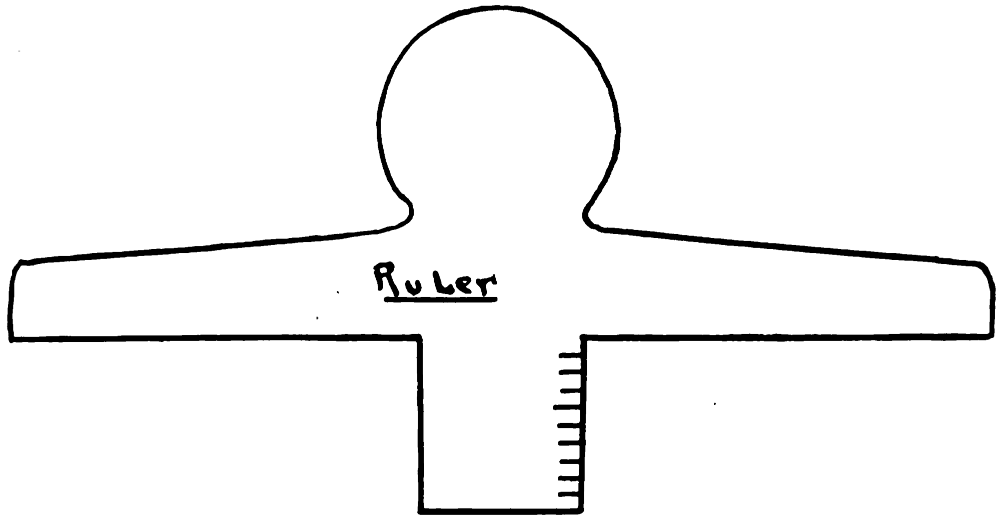

FIGURE XII.—ELMORE'S CELLULOID RULE FOR MEASURING THE DEPRESSION OF THE SCAPHOID TUBERCLE.

FIGURE XIII.—THE OUTER ARCH OF THE FOOT. THE ASTRAGALUS IS CLEARLY SEEN. THE ASTRAGALUS HAS NO MUSCLE ATTACHED TO IT.

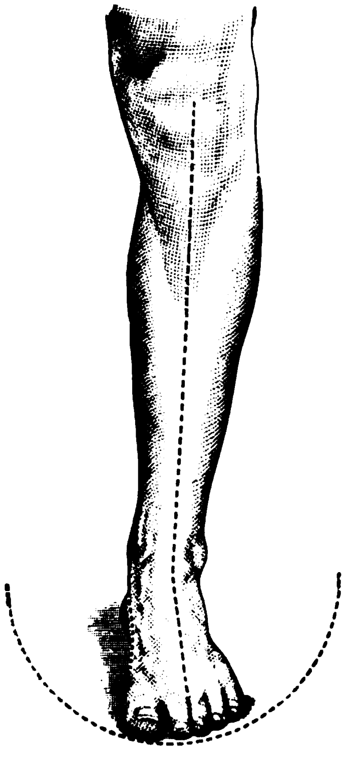

Figure XIV.—Showing that a line along the crest of tibia continued over the foot falls over the second toe.

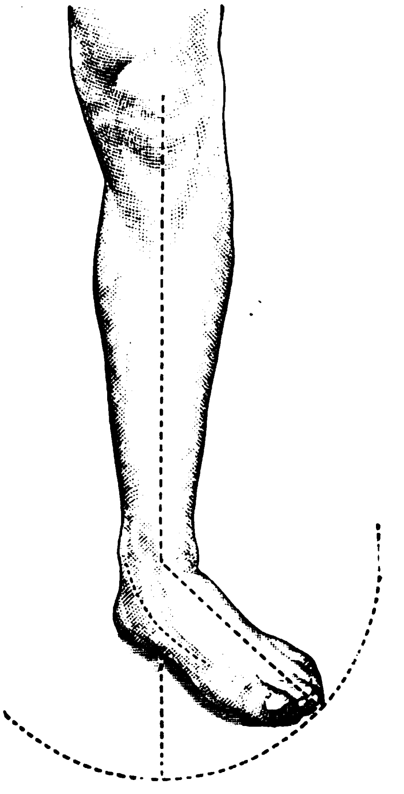

Figure XV.—Showing that a line along the crest of tibia continued over the foot falls inside the great toe and the foot is splayed.

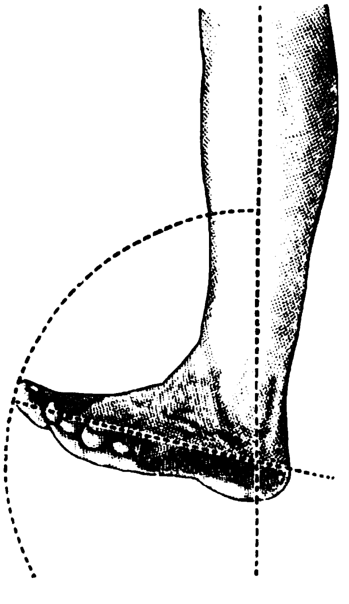

Figure XVI.—Voluntary dorsal flexion.

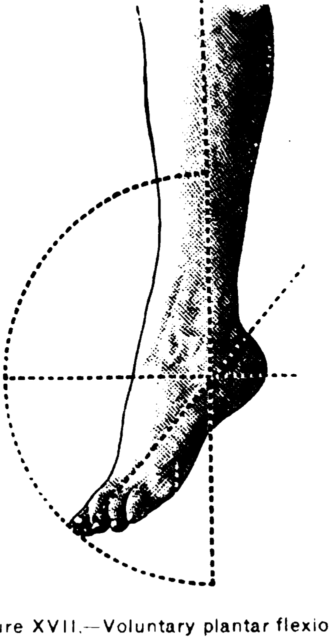

Figure XVII.—Voluntary plantar flexion.

(AFTER WHITMAN.)

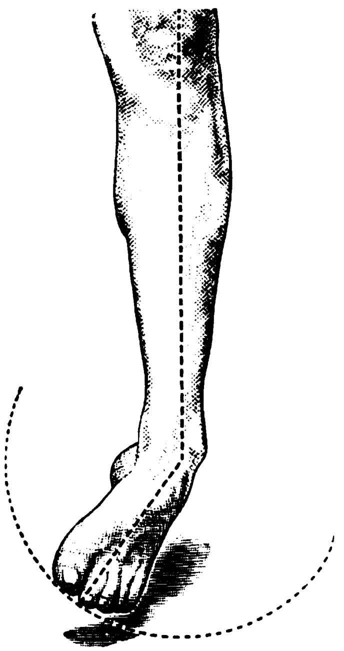

Figure XVIII. Voluntary adduction.

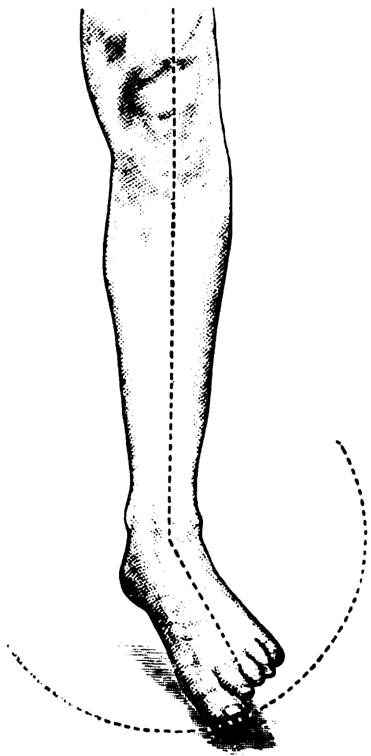

Figure XIX. Voluntary abduction.

(AFTER WHITMAN.)

the savage tribes, or in those not bred to the shoe, all serve to discount the value of this imprint as an aid to diagnosis. According to Whitman: "Of all the tests, this, so often used to demonstrate the height of the arch and thus confirm a diagnosis of flat foot, is of least importance."

Range of Motion.—The range of motion in examining the foot should include flexion, abduction, and adduction.

Under normal circumstances the foot will show a concavity along its inner surface, and a line along the crest of the tibia continued over the foot falls over the second toe. (See Figs. XIV and XV.) Voluntary dorsal and plantar flexion is accomplished by the movement of the astragalus upon the leg bones between the internal and external malleoli. Dorsal flexion is normally between 10° and 20° less than a right angle between the foot and leg. Plantar flexion is much greater and is between 50° and 60° more than a right angle between the foot and leg. (Figs. XVI and XVII.)

During voluntary abduction and adduction the astragalus is practically fixed between the internal and external malleoli, and the foot moves on the astragalus. The actual range of adduction, while difficult to measure, is about 30° from the line continued from the crest of the tibia; abduction is about 15° from this line. (Figs. XVIII and XIX.)

Voluntary adduction, or inversion of the foot, is the most important test of all motions to show the weaknes of the foot. Extend the leg; keep the crest of the tibia fixed in the median line, then have the patient turn the foot inward as far as possible without rotating the leg. According to Whitman: "Even mild and early cases of weak fo ot usually show some limitation of this most important motion, and in many instances it is completely lost, the patient turning the entire limb in the effort to adduct the foot." (See Figs. X and XI.)

Pain in the arch of the foot, pain deep in the sole, pain along the inner border of the foot and under the malleolus. This appears to be the most frequent pain complained of. The pains in ankles and calves frequently accompany these pains, even radiating into the thighs.

WEAK FOOT AS A CAUSE OF DISABILITY IN THE NAVY.

For several years weak foot or flat foot as a disability has occupied an important place in the damage rate of the Navy. This deformity during the last three years has occupied either second or third place in the list causing disability discharge. The ratio during this period has been 2.37 per 1,000.

By far the greatest ratio is attributable to the Marine Corps. The average complement of the Navy for 1912, exclusive of marines, was 52,157, and the average ratio for discharges in the Navy was 1.82 per 1,000. The ratio for the Marine Corps was 6.77 per 1,000.

It is worthy of note that of 151 boards of survey, in 143 cases the condition was judged to have existed prior to enlistment.

WEAK FOOT AMONG MARINES.

An examination of 68 clinical cards returned during 1912 for men of the Marine Corps shows that the majority of the cases were in young men between 21 and 24 years of age. In 54 of these 68 cases the medical officers considered the initial symptoms as occurring prior to enlistment. Only two of these cases had any note on their record to show that any degree of flat foot existed at the time of enlistment. Of these 68 cases 16 were returned to duty, but 6 of these were finally discharged during the year.

The following cases selected from the noble 16 who were discharged to duty are worth reading, and will convey some idea of the fitness of the men to continue in the service.

J. R. An old service man, age 31; 10 years previous service. History of the condition dates back six years. Both feet flat. States he can not perform duties on account of condition of feet. Transferred to naval hospital, Boston, Mass., May 28, 1912. He was kept here until June 21, when he was discharged to duty. The following note appears on his record at this hospital: "Both feet affected. Arches low, not flat, already been treated at six naval hospitals for this condition. Present symptoms occurred synchronously with his being reduced to private. Exercises and supporting bandage."

The "six naval hospitals" and the "reduction to the rate of private" evidently assisted this medical officer to weigh the value of the man's subjective symptoms.

L. O. Age 28, of 19 months service. In guard at Pekin, China. Both feet flat. On account of the difficulty with his feet when standing guard or on a hike he was transferred to the naval hospital, Yokohama, Japan. February 20, 1912, the medical officer noted that the condition existed prior to enlistment, "Never able to complete a hike."

Naval hospital, Yokohama, scaphoid tubercle depressed one-half inch, and within normal limits. Exercise prescribed and improvement noted. Discharged to duty April 30, 1912.

Again admitted for flat foot, naval station, Cavite, P. I., July 17, 1912. Old history of injury to both arches adduced "run over by a truck." Under treatment here for one month and then transferred to naval hospital, Mare Island, Cal., from which hospital he was invalided from the service October 11, 1912.

This case is interesting as the saphoid tubercle was not depressed more than one-half inch, and also the benefits of exercise were not lasting. There is, however, the history of an injury in this case.

R. V. Age 24, was admitted January 12, 1912, having had less than one year of service. Card states: "Condition existed prior to enlistment. Has had occasional pains feet, ankles, and calves, toward end of long march or tour of sentry duty. Was put in galley 10 days ago and after 4 days there had almost continuous pains feet, ankles, and calves. Feet strapped for past two days; no improvement. Present

condition appears duė to long standing and walking in galley. Bed, hot soaks, and massage. Foot exercises, t. i. d.

"January 14. Unimproved. Pair of arches bought.

"January 16. Feet no better and possibly worse after two days careful use of arches. Not considered fit for service. Medical survey requested.

"January 17. Commanding officer disapproved survey on ground that patient is malingering, evidence being that patient begged to be accepted on enlistment; that he had no trouble with his feet until December, 1911; that during this time he went through Cuba campaign, marches, etc., with no trouble; that he was married November, 1911; that he endeavored to avoid sea duty because of flat foot December 19, 1911; that present pain began with duty in galley which he disliked; that it is common rumor among men of the command that patient was going to be surveyed for flat feet. Patient refuses to wear arches longer on ground that they hurt his feet. Feet strapped."

January 20 the patient was discharged to duty, refusing to admit that he was any better.

January 27 he was again admitted, having been unable to do duty. He was surveyed and discharged from the service February 8, 1912, for physical disability.

From a perusal of the above case one is uncertain whether the man was a deep-dyed villian or that virtue hath its own reward.

N. B. Admitted naval station, Cavite, P. I., May 5, 1912, unable to do duty. Age 23 years; nine months previous service. Pain in left foot, calf, and thigh. History of this "rheumatism" extending back two years.

Transferred to hospital, Cañacao, P. I.; under treatment here until June 10, 1912, without sufficient improvement to return to duty. Transferred to U. S. S. *Colorado* for transfer to naval hospital, Puget Sound, Wash. Discharged from naval hospital, Puget Sound, Wash., upon recommendation of a board of medical survey.

This case evidently had a weak left foot at the date of enlistment, which did not amount to a disability until nine months after enlistment.

A. R. H. Admitted to sick list naval station, Olongapo, P. I. Note on record shows a slight depression of arches; exercise prescribed. A note, March 10: "It is believed that he exaggerates his condition. Light duty around hospital causes pain in feet, while liberty has no such effect." March 14. To duty. Recommended to post commander that he continue exercise for flat foot.

F. M. Age 23. Condition existed prior to enlistment according to medical officer. He first came under observation January, 1912. Bandaging and steel arches were tried, but he had to be relieved from active guard duty. This continued for three months, when, on account of lack of improvement, he was transferred to the naval hospital, Boston, Mass., on July 24, 1912. He was continued under treatment about one month, using mainly supports to the arch and bandaging, and was sent to duty August 16, 1912.

Returning to duty, he began to complain as soon as he was placed on guard duty. On August 24, 1912, he was again sent to the hospital, where he was eventually surveyed and discharged from the service September 27, 1912, on account of his disability.

B. M. Age 23 years. Condition said to have existed prior to enlistment. Admitted to the sick list while serving on the U. S. S. *Michigan*. Sent to naval hospital, New York, where he was treated with exercise and strapping for a period of two months,

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and then, in view of the improvement in his case, was sent to duty. Less than one month later, while on duty at Port Royal, S. C., his disability returned, and he was surveyed and invalided from the service.

W. T. Age 22. Has been in service 1½ years. Medical officer on board the U. S. S. *Delaware* excused him for four days and made the following note: "Says it is positive agony to walk his post. Has been admitted before, November, 1911 (dated June 20, 1912), and excused from drill several times on account of his feet. Feet bandaged and exercises. Sent to duty to continue exercises."

The above history can hold little assurance for an ultimate cure to a degree to make him fit for service.

J. V. Age 25 years; 11 months previous service. Condition existed prior to enlistment. Excused for one day after having earned the title of a "regular sick-caller." Admitted again one week later and surveyed for discharge from the service.

In the Navy ratings, of 95 discharges by recommendation of medical survey, 56 were in the rates of apprentice seaman, ordinary seaman, and coal passer; the numbers being 24, 17, and 15, respectively. As the majority of all histories showed that the initial symptoms occurred prior to enlistment, these are the rates where one would expect to find the greatest number of cases. All were young men, enlisted with weak foot, rather than flat foot, who were found unfit in the try out.

Reviewing the clinical cards, 86 of which were returned for 1912, 28 were discharged to duty. This is a better showing than for the Marine Corps, but of these 28 cases 5 were readmitted and discharged from the service within the year, while 8 were readmitted two or more times.

The totality of experience, once the symptoms of the disability appear, shows weak foot to be a poor risk. The sufferer is unable to meet service conditions and more often than not "he lays down on his job," and some one has to do his work for him. A notable number occurred in the rating of ship's cook.

TREATMENT.

It is not the purpose of this article to review the treatment of weak foot or flat foot beyond commenting on what in service experience has been of benefit to make a working man out of a cripple. Soaks, strapping, bandaging and rest have all been tried for the relief of the painful symptoms, and their value for temporary relief needs no comment.

Metal arches have been unsuccessful in all cases reported. Unless a plaster cast is made of the foot in a position of adduction and a steel arch made to conform to the proper contour, as recommended by Whitman, the measure is more apt to increase the pain than to afford relief. Not one man upon whom they were tried appears to have been benefited to the extent that his disability did not finally

disable him from service. The following extracts from clinical cards are characteristic:

E. F. J. Patent arches tried in the shoe for past week, but patient can not walk as well as without them.

G. M. Arches in shoes have only increased his subjective symptoms.

R. V. January 14. Unimproved. Pair of arches bought for shoes.

January 16. Feet no better and possibly somewhat worse after two days careful use of arches.

January 17. Patient refuses to wear arches longer on the ground that they hurt his feet.

W. F. Arch supports have been tried but aggravate the trouble.

Operative measures directed toward the bones and the ligaments are several in number, but I doubt if we could expect them to do more than to make a cripple a little less of a cripple, rather than to make him fit for service.

Exercise and the teaching of men the proper way to develop their feet seem to afford the most promising results. These exercises should be undertaken in the incipiency of the weakness. The development of the plantar muscles, the tibialis posticus and anticus and the group of muscles that give spring to the foot, the avoidance of keeping the foot in a prolonged attitude of pronation and rest should be insisted upon. The prolonged standing with the relaxed muscles throws all the strain upon the ligamentous structures, when the burden should be shared by the muscles. Tiptoe exercises with the feet in voluntary adduction are the type of exercises to develop the muscles most concerned in giving strength to the inner arch; raising the full height of the long arm of the inner longitudinal arch and then easing slowly down to the outer arch which exercises the transverse arch of the two feet. The development of a proper leverage walk is of great value, and here we must look to adaptability of the shoe for the foot. Munson's book on the "Soldier's Foot and the Military Shoe" is well worth reading.

The question naturally presents itself: What degree of weak foot may be accepted for service? It is certain that a large number of cases of weak foot are enlisted without being recognized in the recruiting office. I think, as a general rule, any man in whom the scaphoid tubercle is not depressed beyond one-half inch below the Feiss line, and who can sit with legs straight, and keeping the crests of the tibia in the median line adduct the feet each between 25 and 30 degrees from the line continued along the crest of the tibia, may be accepted as attaining a standard. It is well also to observe the contour of the inner border of the foot, the feet being placed side by side.

What degree of flat foot should constitute a disability? I think this must depend largely upon the man's rate. We would naturally

expect less disability for this cause in the yeomen than in the marine, whose duty is largely a question of feet.

I think that before a man is surveyed a careful examination should be made along the lines already enumerated under symptoms and a suitable note made of the result, and an opinion formed from the totality of symptoms. A man once in the service ought to be given a reasonable tryout to demonstrate his unfitness. If the man has been in six naval hospitals, or has just been reduced in rating, or if his feet cause him agony when engaged on light duty but are as light as the winged feet of Mercury when on liberty, consideration may well be taken of those circumstances which alter cases. At the same time, it is just as well, if he was married November, 1911, not to stop the examination there, but to take a look at his feet and get the facts.

The tendency of recruits who have not adapted themselves to service conditions to make the most of their disability and to exaggerate their subjective symptoms is well known. Very little can be done to benefit the man unless he will cooperate with the medical officer. The prescribing of special exercises for a man and assisting him in developing the strength of his feet is often tedious to doctor, patient, and division officer, but if it can save a good man for the service, it is worth while.

A NEW THEORY OF VENTILATION AND ITS APPLICATION IN CERTAIN SITUATIONS ABOARD SHIPS.

By F. L. PLEADWELL, surgeon, United States Navy.

Following the wide-spread acceptance of von Pettenkofer's views regarding ventilation, we have been brought up to believe that the discomfort experienced in a crowded and poorly ventilated room has been due either to oxygen deprivation associated with carbon dioxide excess, or to the accumulation of an hypothetical organic poison, or to a combination of these factors.

It is somewhat disconcerting therefore to our preconceived opinions on this subject to learn that these factors are now considered to be of minor importance or even negligible value, and that the pernicious influences of a bad ventilation arise from entirely different conditions. The acute effects of a poor ventilation are now attributable to physical conditions rather than chemical changes in the air.

The idea that the chemical composition of the air was an imperfect criterion of its hygienic value has been gaining ascendancy in recent years, based upon the results of experiments by several well-known investigators in this field of research. A brief review of the theories previously held is not without interest and will serve to orient us with respect to what follows.

After numerous experiments failed to make the carbon dioxide content of the air responsible for the evil effects of poor ventilation,

hygienists turned to the theory that some organic pollution from the expired air of the lungs was responsible, and ventilation sought to remove the deleterious matter whose concentration in the air of inhabited apartments was assumed, and of which the carbon dioxide percentage formed the index. Long before 1887, when Brown-Séquard and d'Arsonval conducted the well-known experiments with mice exposed to respired air in varying concentration, the results of which seemed to lend support to the theory of organic pollution, it had been experimentally determined by Le Blanc in 1842 that carbon dioxide alone could not be held accountable for the injurious qualities of confined air. It has since been pointed out that even in the worst ventilated rooms the oxygen supply is more liberal than in the celebrated health resorts of the Alps and that the amount of carbon dioxide under equally bad conditions never reaches the degree of concentration which experimentally has proved entirely harmless. A vitiated atmosphere rarely shows more than 50 parts of CO_2 per 10,000, while in the chamber experiments to be subsequently described, 2 per cent, the equivalent of 200 parts per 10,000, was breathed with impunity. As a matter of fact, Haldane [1] has shown that whatever the percentage of carbon dioxide in the atmosphere, its tension in the pulmonary air is kept constant by the action of the respiratory center and that no harm results from an excess of this gas provided the oxygen tension is maintained at or near its usual level.

With respect to the theory of specific toxicity of expired air, no adequate proof has been forthcoming. The experiments conducted by Billings, Mitchell, and Bergey [2] in 1895 entirely negatived the theory of organic pollution formerly held and based upon the results of Brown-Séquard's investigations. Only recently has there been any revival of this theory. In 1911 Rosenau and Amoss [3] succeeded in demonstrating the existence of an anaphylactic reaction in guinea pigs when injected with the blood serum of individuals whose expired air had been previously condensed and used to inject these animals. This experiment would apparently indicate that the expired air does contain proteid matter which served to sensitize the guinea pigs toward proteids in the serum of the persons from whom the first proteid was derived. The exact hygienic significance of these findings still remains unsettled, but it is not at present apparent that they lend material support to the former contention of a specific organic poison in expired air responsible for the ill effects of bad ventilation.

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[1] Haldane and Priestley: The Regulation of the Lung Ventilation, Jour. Physiol., 1905, xxv.

[2] Billings, Mitchell, and Bergey: The Composition of Expired Air and its Effect on Animal Life, Smithsonian Institute, 1895.

[3] Rosenau and Amoss: Organic Matter in Expired Breath. Jr. Med. Research, No. xxv, p. 35, 1911.

The significance of bad odors, in connection with poor ventilation, is confused by the legitimate impression possessed by everyone that they must be suggestive of some organic constitutent in expired air, but all experimental evidence goes to prove that the offensive odor perceived by the senses of one who enters a long-occupied compartment proceeds from the secretions of an unclean skin, soiled clothing, the mouth, etc., and not from the exhaled air of the lungs. It is a fact that such odors may not be noticed by those who remain for any length of time in the crowded space and that the effect upon others who may enter it from a purer atmosphere is by many experts considered to be largely nervous or psychical. Prof. Hough[1] illustrates this phase of the ventilation problem by relating the story of the man who was unable to go to sleep in a hotel because he could not open the window before retiring and who finally, in sheer desperation, threw his iron bootjack against the glass and broke it, after which he fell into a sound slumber, which was undisturbed until daylight awoke him and revealed the fact that he had only broken the mirror which formed the door of his wardrobe.

It is not to be denied that chemical purity of the air is desirable in occupied rooms, especially in large public assemblies, in order to diminish the chance of mass infection by pathogenic bacteria; but it must be admitted that there is little hope of escaping from the influence of the bacteria which are sprayed, coughed, and sneezed out in countless numbers in such places. Immunity alone will protect the individual from such infection.

Finally, in recent years, elaborate series of experiments have been carried out by a number of observers, the results of which go to show that the subjective sensations and feelings of discomfort experienced by those who are confined in closed apartments inadequately ventilated are due to elevation of temperature combined with a steadily increasing relative humidity and often a resulting high wet bulb temperature. A brief mention of one or two of these experiments will reveal their general character. Heymann, Paul, and Ercklentz,[2] working in Flügge's laboratory in 1905, found that when a man was confined in an air-tight box or chamber no discomfort was felt until the temperature and humidity had increased to a certain point, and that when the confined air was set in motion by a fan the disagreeable sensations were relieved. Similar experiments have been carried out by Benedict and Milner,[3] by Leonard Hill,[4] and by Prof. Theodore Hough.[5]

[1] Hough, Theodore: Physiological Aspects of Ventilation. Am. Pub. Hyg., 1910, xx.

[2] Heymann, Paul, Ercklentz, Flügge: Ztschr. f. Hyg. u. Infectionskr., 1905, xlix.

[3] Benedict and Milner: Experiments on Metabolism of Matter and Energy in the Human Body, Bulletin No. 175, U. S. Exper. Sta., Dept. of Agric., 1907.

[4] Hill, Leonard, Rowland, R. A., and Walker, H. B. The Relative Influence of Heat and Chemical Impurity of Close Air. Jr. Phys. 1910 xli., Proc. Phys. Soc. Oct. 15, 1910.

[5] Hough, Theodore: The Physiological Aspects of Ventilation. Am. Pub. Hyg. 1910, xx, p. 262.

The short description of Hill's experiments which follows appears on page 522 of the Naval Medical Bulletin, 1911:

Eight men were shut up in the chamber. No ventilation was allowed. After 44 minutes the dry bulb stood at 87° F. The CO_2 had risen to 5.26 per cent. The oxygen had fallen to 15.1 per cent. The discomfort felt was very great; all were wet with sweat, and the skin of all was flushed. The talking and laughter of the occupants had gradually become less and ceased. Immediate relief resulted from turning on the electric fans and whirling about the air in the chamber—very great relief in spite of the temperature of the chamber continuing to rise. On turning off the fan the discomfort returned and the occupants cried out for the fans. Later two men were shut up in the chamber, a subject and observer. The electric heater was used to raise the temperature to about 85° F., wet bulb. The subject inhaled through a soda-lime tin and exhaled through an air meter. In this way CO_2 was inhaled only in traces. The turning on of the fans gave complete relief to the feelings of discomfort and lowered the pulse frequency. Having proved this, the subject ceased breathing through the soda-lime tin. A bag containing CO_2, enough to raise the percentage in the chamber to about 2 per cent, was opened, and the CO_2 allowed to escape into the chamber unknown to the subject. The sudden increase of CO_2 had no influence on the discomfort; it was not increased in spite of the increased depth of the respirations. The turning on of the fans relieved the discomfort as before.

Since Flügge's original experiments in 1905 many other competent observers have thus verified his results, and it can no longer be questioned that temperature and humidity are environmental factors of extreme importance, which must be carefully considered in any adequate system of ventilation.

Since the physiology of heat production and heat dissipation bears immediately upon the theory of ventilation under discussion, which emphasizes the important relation of atmospheric heat and humidity to comfort and health, and since those factors are also inseparably associated with life at sea in a modern vessel, it is of considerable importance to expose briefly the underlying principles of heat production and heat loss, particularly the latter.

The living body is normally surrounded by widely varying atmospheric conditions, toward which it possesses a power of physiological adjustment, within certain limits. In many of the situations aboard ship these conditions transcend the usual limits, and adjustment becomes difficult or impossible, except for very brief periods, unless there is some assisting agency, like artificial ventilation. When once the balance is disturbed by long exposure to extreme conditions of pressure, heat, cold, humidity, etc., pathological effects are likely to ensue. In proportion as the air temperature approaches or rises above that of body and humidity is high enough to prevent radiation and evaporation of perspiration, loss of body heat is minimized. As heat is being produced constantly, its nonelimination, for any reason, results in a rise of internal temperature and eventually in a febrile condition or even hyperpyrexia and heat stroke. Such a condition comes sooner if the surrounding temperature is much elevated, if

mechanical work is being done, and if there is any limitation of air movement about the body.

Haldane's[1,2] observations have also indicated that in air heated above a certain level of temperature it is the temperature of the wet bulb thermometer which determines the ill effects, rather than that of the temperature of the air as shown by the dry bulb thermometer. He found that in still air when the wet bulb exceeds 88° to 90° F., the body temperature begins to rise, and when once started this continues until symptoms of heat stroke appear.

That this sequence of events represents what may readily occur in an engine room or even in any other over heated compartment below, unless there is present some modifying influence, was clearly shown in the engine room test of a year ago, in which the writer participated. Briefly the conditions which prevailed in the test were those of a closed space in which the temperature was far above that of the body and with a relatively high degree of humidity for this temperature. The temperature was not constant, for extensive surfaces radiated heat into the closed space and means of escape for heat were almost entirely eliminated. There was no air movement, since ventilation was stopped, in order to simulate an assumed battle status, namely, that to be described later where noxious gases and smoke surround the ship and necessitate an interruption of the ventilation.

Within a few minutes after starting the test symptoms of loss of heat balance were observed. The pulse rate rose, there was a fullness in the head, a decided feeling of discomfort and oppression, headache and dizziness, and after emergence from the engine room several individuals showed a decided rise of temperature. Subsequently headache and a feeling of extreme physical exhaustion were noticeable. There was no dissent from the opinion that serious results if not complete disability would have followed if the test had been persisted in for long, and it was clearly demonstrated that some special provision must be devised to meet this emergency of battle, even if only of a temporary nature, serving to tide over a critical period of short duration.

What may happen in a naval engagement when ventilated compartments below deck are overwhelmed by smoke and powder gases has been largely deduced from the observations recorded in the rather meager accounts of the naval engagements of the Russo-Japanese War, but some of these accounts are sufficiently detailed to indicate that a ship against which a shell containing high explosive may burst, or whose smokestacks are perforated, remains for some

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[1] Haldane: Reports of the Department Committee in Humidity and Ventilation in Cotton Weaving Sheds, London, 1909, 1911.

[2] Lee: Effects of Temperature and Humidity on Fatigue, Am. Pub. Health, Nov., 1912.

time enveloped in an atmosphere of smoke and noxious gases, which, being drawn into the ventilation systems, are delivered with the air supply to compartments below in sufficient concentration to imperil the efficiency of the personnel there, if they do not absolutely overcome them.

In a Russian account of the battle of the Sea of Japan, written by Capt. Vladimir Semenoff,[1] there occur the following passages:

> Word had been received from the engine room that the men were being suffocated and rapidly falling out, as the ventilators were bringing down smoke instead of air. * * *
>
> The silence of the dead reigned in the smoky darkness, and it is probable that all who were in the closed compartments under the armored deck where the ventilators took down smoke instead of air gradually became suffocated, lost consciousness, and died.

That the conditions thus described were representative of what occurred in that engagement was confirmed by an officer who participated in the battle, in a statement made to the writer upon the occasion of the meeting of the Fifteenth International Congress on Hygiene and Demography, held in Washington last September. This officer, a Russian naval surgeon, asserted the substantial truth of the observations quoted above.

It appears, therefore, that we are fully warranted in assuming that such a situation may arise in future naval warfare, and that the resulting conditions may be such as will threaten the physical welfare of the personnel and perhaps seriously affect the value of the ship at the moment when she is seeking to exert her highest function.

To ameliorate these conditions and maintain the engine-room force in a state of physical efficiency during battle constitutes one of the most vital problems engaging naval hygiene to-day, for upon their ability to continue at work will depend the favorable outcome of the battle.

We are concerned, therefore, with devising some expedient whereby this force may continue their labors under the exigency of battle when plenum ventilation becomes a menace to the life below and must be stopped, temporarily at least.

This problem, for the reasons already adduced, is a peculiarly acute one in modern naval vessels, where some ventilation or air movement is essential to continuous physical and mental efficiency, if not to physical integrity.

During the engine-room test previously referred to, it had occurred to the writer that much of the discomfort felt on that occasion, and attributable to the increasing heat and humidity, acting in an absolutely stagnant air, might have been mitigated largely if some means of agitating the air immediately about the body had been at hand.

[1] Semenoff: The Battle of Tsushima, Lindsay, translator.

When some time later an account of the experiments carried out by Leonard Hill was published,[1] in which the occupants of the closed chamber were entirely restored by starting the electric fans, the adoption of a similar expedient in the somewhat analogous situation in the engine room was suggested.

It is believed that a number of electric fans actively creating air movement in the engine room on that occasion would have operated to displace the hot humid air that hung closely about the body by air that was less humid,[2] though perhaps not much cooler, and acted to restore the physiological balance and bring about a readjustment to the prevailing conditions.

It is realized that such an expedient may only be effective for a limited period of time, but it should be observed that the emergency calling for interruption of the usual ventilation during battle may be temporary only. All present estimates indicate that the naval battle of the future promises to be a matter of minutes rather than hours.

Why not adapt and apply the results of the experiments conducted by Flügge and his successors to the engine room and to other compartments below where interrupted ventilation in battle will invite disaster?

Similar results might also be achieved by an arrangement whereby the air supply to the fans is taken not from the main and gun decks, where smoke and powder gases will probably exist in greatest concentration, but from some lower level or from some other compartment well forward, containing air comparatively free from gases and also of a lower temperature.

The really essential requirement, as we have seen in the closed chamber experiments, is to have the air in active movement in order to modify and dissipate the heat and humidity immediately about the body, and this can be done by stationary electric fans placed in any compartment likely to suffer from a battle casualty of this character.

While the arrangements thus suggested are admittedly largely theoretical and will require the test of experience to establish their worth, it is believed that the experimental evidence previously adduced makes it highly probable that they would be effective for a short period of the time during an engagement.[3]

A more recent article by Leonard Hill[4] still further emphasizes the importance to be assigned to heat and humidity in arranging for any efficient system of ventilation, and insists that the efforts of the heating and ventilating engineer should be directed toward the

[1] Naval Med. Bull., 1911, p. 522.

[2] The initial per capita allowance of air was about 3,100 cubic feet (in the engine room).

[3] Subsequent experiments in the engine room have tended to confirm this belief. (See paper on Hygiene of the Engine-room Force read before the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., September, 1912.)

[4] Hill, Leonard, M. B. F. R. S.: Facts and Fancy about Ventilation. Sci. Am. Supp., Nov. 30, Dec. 7, 1912.

cooling air in crowded places and cooling the bodies of the people by setting the air in motion by means of fans. He reasserts that the chemical purity of the air is of very minor importance.

Similar deductions are presented by Dr. Simon Baruch [1] in a letter to the editor of the New York Medical Record, in which he states that it is not the oxygen in pure air that is beneficial in the open-air treatment of disease, but the influence of air currents acting on the lungs indirectly by way of the skin.

The practical application of these views promises to be of great value in hygiene and therapeutics, particularly in the special field comprising the hygiene of naval vessels.

AURAL AFFECTIONS DEPENDENT UPON VISCERAL LESIONS AND FUNCTIONAL NERVOUS DISORDERS.

By J. J. Richardson, assistant surgeon, Medical Reserve Corps, United States Navy.

The relationship existing between aural disturbances and certain visceral lesions and functional nervous disorders is most intimate. Failure to appreciate fully this fact, however, is too often the secret of many unsuccessful results met with in otological practice. Clinical experience has demonstrated that pathological changes in almost any part of the body may produce within the ears both alteration of function and certain visible changes. A large percentage of the diseases which fall to the lot of aurists are secondary, or occur as a complicating feature of diseases in other parts. The majority result from pathological changes in the adjacent structure, namely, the nose and pharynx. While diseases in these parts have a direct bearing upon the etiology of aural diseases, we must not permit ourselves to look upon them as the only factors in their production. Many others play an important part. Visceral diseases and nervous disorders are etiological factors to be carefully looked into in searching for causes. The manner in which the former operate in producing their effects upon either the auricle, tympanum, or labyrinth may be said to be through the general venous circulation, the quality of the blood circulating in the vessels, by degeneration of the arterial walls, and lastly, but not as infrequent as might be supposed, reflexly.

Rheumatism and gout at times attack the ears, and in subjects who have had no special manifestations of acute attacks. There may exist only a hereditary diathetic condition, but it will exert a marked influence at times. We have met with instances of nonsuppurative otitis media where the usual remedies for relief proved of no avail and where only the resort to remedies for the correction of the rheumatic or gouty taint afforded relief. They are nothing more or less than attacks

[1] Baruch, Simon, Dr.: N. Y. Med. Rec., Nov. 16, 1912.

of articular rheumatism affecting the interossicular articulations, and follow the same course as in the larger joints. The pain will be severe and accompanied by marked constitutional disturbances. Ankylosis of the ossicles is frequently the result, and at times permanent impairment of the hearing. Slight but persistent eczema of the auricular canal and a crippled tympanic drum membrane from chalky deposits within its layers are frequently encountered in gouty patients. Arterial degeneration is familiar to all. The tympanic and labyrinthine vessels do not escape. Their walls become rigid and weakened and their caliber diminished by a deposit of calcareous salts. As a result, sudden change of blood pressure causes rupture of their walls and hemorrhage, with sudden deafness, subjective noises, dizziness, and nausea.

Nephritis is by no means an uncommon factor in the etiology of certain ear diseases. The pathological conditions are produced by a general venous obstruction, arterio-capillary fibrosis, or an impoverished condition of the blood circulating within the vessels. We have met with several cases of effusion of serum through the vessel walls into the tympanum similar to that of pleural effusion occasionally occurring in nephritis. The condition is of a noninflammatory nature, although it is frequently designated otitis media serosa. It is in fact a dropsy of the middle ear and the process of its occurrence is entirely mechanical. In conjunction with this effusion there is frequently a partial obstruction of the Eustachian tube due to a passive congestion of its mucous membrane. The diminished caliber of the tube interferes with the ventilation of the middle ear, so that the altered atmospheric pressure favors the passing of the fluid from the blood vessels into the tympanic cavity. The symptoms produced are not of an inflammatory nature. The patients do not complain of a distinct pain in the ears, but rather a feeling of numbness or heaviness about the head. The hearing will be impaired and frequently tinnitus of a most distressing character will accompany it. There may be a great variation in the hearing, according to the position of the head, as the fluid is capable of a certain amount of motion. A bubbling or snapping sound is a characteristic symptom in these cases during the act of deglutition or when the patient forcibly blows his nose. Certain chronic hepatic and cardiac diseases may produce similar conditions. Hemorrhages from rupture of weakened vessel walls about the external meatus, between the layers of the membrana-tympani, within the tympanum or labyrinth, may occur and render the parts involved either temporarily or permanently incapable of performing their function. It may be stated, however, that the blood supply of the labyrinth is derived from several different channels, so the occlusion of one of its vessels might take place without perma-

nently impairing the function of the part involved, the blood supply being reestablished by collateral circulation.

A case of interest in this connection came under my care the past summer. It was that of an unmarried woman 30 years of age, who was referred to me by her physician for a recent ear trouble and attacks of profuse epistaxis. The patient otherwise enjoyed apparently perfect health. Examination of the ears revealed a labyrinthine irritation from some obscure cause producing vertigo, subjective noises, and impaired audition. No pathological condition about the nose could be discovered to account for the occurrence of the frequent nose bleeding, and the facts were reported to her doctor.

Examination of the blood and urine failed to throw any light upon the etiology of the condition. She was treated along general lines for several weeks, when she went to Europe for two months. The symptoms continued, but were not of sufficient intensity to mar the pleasure of her journey. Throughout the return voyage she was very ill and quite weak on her arrival home. This was attributed entirely to the seasickness. Two or three weeks after her return she was taken with an attack of vomiting, followed by delirium, coma, and death within 10 days. An examination of the urine at the onset of the last illness showed large quantities of albumen.

It was a case of interstitial nephritis, and the early changes which took place in the auditory nerve and the nerve tissues of the labyrinth were similar to those frequently occurring in the optic nerve and retina as among the earliest of the symptoms in some forms of Bright's disease.

Diabetes.—In diabetes all the structures of the ear are more liable to the occurrence of inflammatory diseases than exists under normal conditions. The symptoms referable to the labyrinth will be the result of hemorrhage or exudation—those of the middle ear acute or chronic suppuration.

Recurrent furunculosis of the ears is often of diabetic origin, and the same may be said of eczema of the external canal and auricle. It is a clinical fact always well to bear in mind that any ear lesion is slow to repair in diabetic subjects, and in acute inflammations of the part suppuration is the rule. The acute suppurative otitis media is frequently unaccompanied by pain which characterizes suppurations of different origin, such as scarlet fever, influenza, etc. Mastoid invasion is frequent and the mortality is high. In a recent report of nine cases operated upon six of them terminated fatally, death resulting from diabetic coma. Minhof, in a recent article, stated that as the diabetic resistance to infection is very much diminished one must operate early, before the patient has a high leucocytosis, if we would avoid courting danger. Another interesting, but fortu-

nately unusual, condition associated with diabetes is gangrene of the auricle. One case of this character came under the observation of the writer, where the greater part of the left auricle became gangrenous and sloughed away, and there was beginning gangrene of the right auricle and the tip of the nose at the time of the patient's death. Examination of the urine showed the presence of large quantities of sugar and albumen. The diabetic condition was undoubtedly the cause of the local necrosis. Other interesting features of this case which may be noted were the age of the patient—it being less than 1 year old, and the short duration of the illness—three or four weeks.

Tuberculosis.—The involvement of the ear in tuberculosis is not uncommon, and its early recognition is important. The invasion is characterized by its frequent sudden onset and rapid destruction of the membrana-tympani and the ossicles. Another peculiarity about it is the usual absence of pain. A discharge will simply begin without any previous discomfort or noticeable impairment of hearing. The perforation of the drum membrane in these cases is characteristic. It is usually circular, and the edges will have a bluish œdematous appearance and show the absence of the bright red color which we are accustomed to observe in suppurative conditions of different origin. There will frequently be more than one distinct perforation in the membrane. The entire bony structure of the ear may become involved early in the disease with breaking down of the ossicles and mastoid cells.

The caries may involve the internal ear or invade the facial nerve and cause facial paralysis.

Bacteriological examination of the discharge does not show usually the tubercle bacilli to be numerous or easy to find; and it must also be borne in mind in this connection that otitis media purulenta occurring in tuberculous individuals is by no means always due to the presence of tubercle bacilli.

Anemia.—No organ or tissue, when deprived of its nutrition, will perform its function as nature intended it should. The ear is no exception, and the altered quality of the blood, as in simple and pernicious anemia, has a disastrous effect and gives rise to distressing subjective noises, giddiness, and impaired audition. It is simply a lack of nutrition, and the labyrinth is the seat of its most prominent aural manifestation. The patients will be listless, inattentive, and have an unconcerned expression. They will hear ordinary conversation with a single person fairly well, but when several are speaking in the same room will be unable to follow the course of conversation without some effort. Extravasations take place in the labyrinth in pernicious anemia and produce permanent structural changes.

Leukaemia produces deafness, and usually it is of labyrinthine origin, although sometimes it is referable to the sound-conducting apparatus. It is sudden, as a rule, in its onset, gradually grows worse, is accompanied by vertigo, nausea, and subjective noises. Our efforts to arrest the progress of the aural symptoms are as futile as the control of the disease itself. One case is recalled, however, where there was marked deafness in the early stage of the disease which subsided as a general glandular enlargement of the upper breathing tract improved. Before the fatal termination the hearing again became bad as a result of hemorrhage or infiltration of lymph corpuscles into the labyrinthine channels.

Metastasis.—Suppuration in any region of the body may be the origin of emboli that will be carried to the ear and find lodgment in some of its parts. In ulcerative endocarditis detachments of the vegetations from the cardiac valves have been carried to the external, middle, and internal ear, with resulting infectious process. We have seen a few cases of acute suppurative otitis media complicating pneumonia where there was no discernible rhinopharyngeal or Eustachian involvement. In such instances there is every reason to attribute the inflammation to infectious germs being carried through the blood current and finding lodgment in the middle ear.

Reflex disturbances.—The phenomena attending the production of some aural disturbances is obscure and can only be explained as being of a reflex nature brought about through the vasomotor system of nerves. We understand precisely the mechanism of a motor impulse, but those of a trophic or sensory nature are not so perfectly understood. The most plausible view, however, and the one generally accepted is that certain changes take place in the vascular system of the ear through reflex stimulation. To this class belong those cases where there is a moderate impairment of hearing and tinnitus resulting from constipation, gastro-intestinal disorders, or disturbances of the pelvic viscera. They are most generally encountered in neurotic women.

The vertigo frequently occurring in disorders of the digestive tract is a reflex condition dependent upon an increased vascularity of the labyrinth from capillary dilatation. The nucleus of the vestibular nerve in the medulla oblongata is very near that of the vagus center, and the stimulation is conveyed from the irritated gastro-intestinal tract by the pneumogastric. No other class of reflex ear disturbances is so interesting as those occurring from the opposite ear. Inflammatory diseases, injuries, etc., of one ear may produce either temporary or permanent changes in the opposite organ.

A very simple experiment and one employed in otological teaching to demonstrate this relationship consists in condensing the air in the auditory meatus and holding at the same time a sounding body of

some sort to the opposite ear. In this experiment it is found that the sudden condensation of air impairs the hearing perception of the opposite ear. The intimate relationship is plausibly explained along physiological and anatomical lines—the path of the reflex current passing through the upper cervical cord.

Clinically, we observe cases of subjective noises referred to one ear where the examination will reveal nothing abnormal, but the opposite ear may show the presence of impacted cerumen, catarrhal changes in the tympanum, or a constricted Eustachian canal. The subjective symptoms often will not disappear until the real diseased member is restored to a normal condition.

Neurasthenia and hysteria.—Those functional nervous disorders, neurasthenia and hysteria, produce marked disturbances referable to the ears. The precise manner in which they influence the various parts is problematical as their own exact nature is still a matter of conjecture. The examination of these cases frequently reveals some slight pathological conditions, but the symptoms complained of will be out of all proportion to the lesion existing. No explanation for the abnormal state can be offered except an overtaxed nervous system where the impairment of any organ is magnified to a very great degree. Every aurist meets with cases of so-called "auditory strain." They occur in individuals who give a history of being able to converse with one person in a room fairly well, but in listening to general conversation the sounds become confused. This class of patients usually hear best and often fairly well in the morning hours, but as the day's labors and fatigues go on the hearing diminishes and the tinnitus which is usually present becomes greatly exaggerated. The hearing power will fluctuate and will be noticeably more impaired in noisy than in quiet places. It differs in this regard from the impaired hearing dependent upon some catarrhal affections of the tympanum. There will be an inability to accurately differentiate sounds.

Neurasthenics frequently allege the existence of a sensation of irritation in the meatus auditorius or in the pharynx about the orifice of the Eustachian tube. The conditions met with in hysteria are closely allied with those of neurasthenia. Where the ear is the organ of least resistance, the symptoms referable to it will be paramount. They may manifest themselves suddenly and disappear as quickly and as mysteriously as they came. Profound deafness may come on as a result of some severe mental shock. The condition is analogous to hysterical or functional aphonia and is sometimes associated with that psychic disorder. The lesion is usually unilateral, but a very curious clinical observation is the transference of the deafness from one side to the other. The organ of one side will be perfectly deaf when sudden and complete restoration of function

will take place and the opposite side become affected. This change has been known to be repeated several times.

Another interesting observation in these cases of hysterical deafness is that whatever the degree of deafness that is manifested, it will be present throughout the attack. There is no variation. Hysterical mastoid symptoms are recognized and such cases tax the diagnostic resources of the most experienced aurists. There may exist fever, pain, swelling, and the classical symptoms of mastoiditis. Many cases have been operated upon and only the results of the operations have revealed the real condition. Our ability to correct many of these disturbances will depend naturally in a great measure upon the amenability of the primary exciting cause to successful treatment and the duration of the trouble before the patients come under observation. A thorough physical examination, including the laboratory tests, is highly important in every case. Where the conditions are obscure, while searching for ætiological factors, we should of course relieve the aural symptoms the best we can without any reference to the real origin of the disturbance. Persistent irritation may produce changes which will persist after the exciting cause has been removed. Where the cases are observed early, however, and the cause is removable, the results of treatment are favorable as a general rule.

THE DETECTION OF THE FEEBLE-MINDED APPLICANT FOR ENLISTMENT—VALUE OF THE BINET-SIMON SCALE AS A DIAGNOSTIC AID.

By A. R. Schier, acting assistant surgeon, United States Navy.

One of the most serious problems and one which is attracting much attention not only on the part of the physician, but also of sociologists, criminologists, and others interested in the promotion of race betterment is the startling increase among us of mental defectives. Census reports show that the insane are increasing much faster than the general population. The number of feeble-minded, including juvenile delinquents (the criminal feeble-minded) is enormous, recent estimates placing the number in the United States at 300,000. Only about 25,000 of this number are institution charges, leaving the balance without any form of restraint. With the presence among us of this number of mental defectives should we not take note, and should it not arouse in the medical officer, whose duty it is to pass on the mental and physical desirability of applicants for enlistment in the naval service, an intelligent appreciation of the necessity of carefully examining into the mental status of all such applicants, using every diagnostic measure which may aid in the detection of and prevent the enlistment of mental misfits?

The term "feeble-minded," as used in the United States, includes all grades of mental feebleness, from that which is but little below normal down to the poor idiot who is so low in the mental scale that he may be said to merely vegetate, and whose every want has to be anticipated and provided by others. The term has come into use in the United States more on account of its euphony and from thoughtfulness for the feeling of those having the burden of such individuals, rather than from any scientific accuracy. In the countries of Europe the harsher terms of idiot and imbecile are currently used. The feeble-minded are individuals in whom there is an interference with the normal operations of the mind, due to a morbid defect in the central nervous system, which may be a gross lesion, or merely an interference in the functionating powers of certain areas; the mental weakness being in some cases capable of some degree of improvement (by suitable training) but never reaching the normal. The condition may be inherited, developmental or accidental, and may occur at any time of conception, during uterine life, at birth or subsequent to birth. In classifying the feeble-minded according to the degree of mental defect those lowest in the mental scale are the idiots, who are either of the restless or apathetic type. Those of a lesser degree of defectiveness are the imbeciles, who, depending on the degree of defect, are divided into the low, medium, and high grade types. The latter types are very near the normal line and include the so-called morons and moral imbeciles.

It is not so many years since the recognition of the feeble-minded individual depended largely on his appearance and when it was believed that if a person appeared normal, it was safe to class him as such. Therefore, if the individual had a well-developed body, regular features, was more or less alert and could talk fairly well, the possibility of a mental defect was ruled out at once. The detection of pronounced cases of subnormal mentality, such as the idiot and low-grade imbecile does not require a great amount of skill, for in these types are usually to be seen the anatomical signs of defect. Such defects include deformities of the cranium, as micro- and macrocephalous, various deformities of the palates and ears, irregularly placed teeth, retarded development of the long bones, causing short and squat figures, supernumerary fingers and toes and many others. They have peculiar facial expressions, subnormal temperatures, and are either very restless or quiet and apathetic. Mentally this class never develops beyond the age of a 2-year-old child; their affective and intellectual faculties being practically in a state of obliteration. It is this class which may be easily recognized by a casual observation and examination.

However, the medical officer on recruiting duty has not to deal with these obvious types but with those degrees of mental defect

known as the high grade imbecile, moron, or moral imbecile. The greatest difficulty is experienced in recognizing these types, for the mental defect in them does not show itself by any physical marks and they are frequently confounded with normals. Such individuals are usually perfect specimens physically as far as outward appearances go. They are usually attractive and bright looking. In them the intellectual defect apparently may be slight and may be overshadowed by immoral and criminal tendencies. As a rule they are plausible talkers and answer readily all ordinary questions asked them. Unless under constant supervision they will not apply themselves at work, with the result that they are constantly changing from one position to another. Being incapable of managing their own affairs, they fail utterly in the struggle and competition for an existence. Filled with instincts and impulses and lacking in control they frequently violate the laws; the consequence of such action and behavior causing them no worry. While the high-grade imbeciles present as great a variation as the individuals themselves, there is one fundamental characteristic present in all, and that is that the mentality slows down or stops developing before the age when the higher functions of mankind demand higher functions of mind to guide and direct them. Psychological tests of such adolescents or adults show that they have a mental age of children from 8 to 12 years old. The large army of ne'er-do-wells who are incapable of conforming to social conventions or to law is recruited largely from this class.

Feeble-mindedness is a permanent condition, and one so afflicted will not have his defect remedied by being placed with normal people. It might be just as reasonable to expect to cure cancer and tuberculosis by placing such patients with healthy individuals. That such is the belief of many laymen, however, is at times called to the attention of the recruiting officer by having brought to him some incorrigible youth, who has been sentenced, so to speak, to enlist in the Navy by some well-meaning but misguided judge, who has been called upon to mete out punishment for a minor offense committed. That the discipline in the service will reform him is the reason for such a sentence. Such incorrigibles are usually feeble-minded, for it has been definitely proven that 25 per cent of all juvenile delinquents and criminals are mentally defective. "Every feeble-minded person, especially the high-grade imbecile," says Dr. Walter E. Fernald, of the Massachusetts State School for Feeble-Minded, "is a potential criminal, needing only the proper environment and opportunity for the development and expression of his criminal tendencies. The unrecognized imbecile is a most dangerous element in the community. There are many crimes committed by imbeciles for every one committed by an insane person."

The acceptance of feeble-minded individuals for enlistment in the military or naval service can result only in an injury to themselves or to the service. E. Schultze found that 50 per cent of mental defectives in the German army had been guilty of "desertion" or "absence without leave." The relation of the feeble-minded to military life are summed up by Schaeffer in his article "Der moralische Schwachsinn," as follows:

First. They are the object of mistreatment at the hands of other soldiers.

Second. They are repeatedly in conflict with discipline and military law.

Third. They are notoriously intolerant of alcohol, and when under its influence frequently commit military crimes.

Fourth. They are emotionally unstable and irritable. Especially are they characterized by unreasonable outbreaks of temper and of assaults upon their superiors.

Fifth. They frequently commit suicide. The defective does not appreciate the value of life and when dissatisfied determines to make an end of himself.

Because of the presence in the United States of so many mental defectives without any restraint, and owing to the instability of such persons, resulting in frequent changes from one position to another, and to the fact that the romance of the service attracts them, is it not to be expected that many will find their way into recruiting offices? The high physical standard set for acceptance into the service disqualifies some of them. As many are, however, perfect physically, they are very likely to be found qualified for enlistment. That some do go unrecognized and are accepted for enlistment is reported by Passed Asst. Surg. Butts, United States Navy, in his article on "Further observations on the Insane of the Navy," which appeared in the United States Naval Medical Bulletin, April, 1912. He says, under "imbecility" and "feeble-minded":

> Of course medical officers are not supposed to enlist this class of individuals, but the fact remains that they do, as testified by the reports of medical survey and health records accompanying enlisted men to the Government Hospital for the Insane.

He further states, in discussing the desirability of having all general court-martial prisoners examined by a medical officer trained in psychiatry for evidence of mental disorder:

> I believe that if the truth were made known by such an examination of the prisoners now serving sentences in naval prisons, many of them would be found mentally defective to such a degree that it would be fairly presumable that they were not mentally responsible for the acts they committed at the time they were committed.

Accompanying the article are shown a number of photographs of degenerate and feeble-minded individuals who were accepted for

enlistment and who should not have been recruited. Speaking of this class, Dr. Butts says:

> It is a pure waste of time for either a line or medical officer to attempt to teach a dummy or imbecile who, if he remains in the service, is sooner or later almost certainly destined for one or both of two places—a naval prison or an institution for the insane.

The Surgeon General of the Navy, in his annual report for the fiscal year 1912, emphasizes the need of more careful examinations into the mental status of applicants when he says that—

> More thorough and painstaking examinations and more intimate knowledge of psychology on the part of the recruiting officers, the study of the temperamental qualifications for certain ratings—will undoubtedly reduce the damage to the service from these affections.—(Mental diseases.)

For the medical officer on recruiting duty to detect the higher types of mentally defective applicants is a difficult problem, for a previous history is lacking, except such as is given by the applicant, and the period of observation is brief. Even though he were a trained psychiatrist, a diagnosis of mental defect under such conditions would be rather improbable. A cursory examination into the mental status of applicants often leads to unsound conclusions, and only a competent psychological examination can differentiate the higher types of feeble-minded from the normal. For the purpose of learning if the Binet tests would not provide an accurate and quick means of determining the mental status of applicants and aid in the detection of mental defectives unrecognizable by the ordinary examination, it was decided to use this system on a series of applicants for enlistment in the United States Marine Corps, at St. Paul, Minn.

The use of the Binet tests in the United States is not new, but, so far as the writer knows, they have had no practical application in the recruiting service. Before undertaking this experiment, the opinions of several well-known workers among mental defectives, who have used these tests extensively as to the practicability of applying them to adults and in this particular field, were obtained. Dr. M. S. Schlapp, director of the recently established Clearing House for Mental Defectives in New York City, believes these tests would be useful in determining the mental status of the applicants. He says:

> Although the Binet tests are only worked out up to the fifteenth year, I believe it is far enough, because if the person goes beyond 15 years mentally he can not be rated as an imbecile. All feeble-minded individuals you will find to fall below the 15-year limit.

Dr. H. H. Goddard expressed himself as follows:

> I think undoubtedly you will find that these tests will show that some of the people that apply to you have a mentality under that of a 12-year-old child. There will probably be others who will pass these tests that are still somewhat delinquent or defective, but for them we have no satisfactory tests as yet.

In replying to the writer's inquiry, Dr. William Healy, director of the Juvenile Psychopathic Institute, Chicago, Ill., said:

I suppose you are aware there is a great feeling of dissatisfaction with the Binet tests for any ultimate diagnosis in many conditions except that in actual *feeble-mindedness*.

The Binet-Simon measuring scale for intelligence or, as it is popularly spoken of, the Binet test, was devised by Alfred Binet, director of the Psychologic Laboratory of the Sorbonne, and T. Simon, and is the result of their efforts toward studying and training the gradual development and diversity of mental processes of children. After an investigation extending over a period of 15 years, during which Binet tried many tests to determine the gradual mental development of children, he finally published his measuring scale. In this scale he included only those tests which had proved their value by actual trial, discarding many of those tried during his investigations. The tests are designed to determine quickly the grade of intelligence of backward and abnormal persons. They are arranged in a graded series, in groups of five, one group for each year up to the thirteenth year. In the American revision the 13-year tests are advanced to the fifteenth year. Each group represents an advance in difficulty over its predecessor, and the whole scale corresponds to progressive degrees of mental development. The tests are varied in type so as to explore all the important phases of intellectual capacity, especially judgment, initiative, good sense, and adaptability. An average normal child should pass the tests given for his age. The person is graded at the mental age for which he passes all the tests, although owing to the uneven development of ability an additional year of mental age is added for each five tests in groups of later mental age. While such a scale of tests may seem an arbitrary one, it has proven its value and accuracy by a trial on thousands of normal and abnormal subjects.

That these are not tests of school training but of mental development is emphasized by Dr. H. H. Goddard, whose revision and adaption of the Binet system to American conditions is in most general use in the United States, when he says:

Any person who has lived in any sort of average environment for the requisite number of years is able to do these tests, even though he has never been to school, even for a day, and by failing in them he manifests his mental defectiveness.

Their applicability to adults has been questioned by some, but results are fully as accurate in the determination of the intelligence of any person, irrespective of actual age, providing he has a mental age below 13 years.

In the series of applicants tested by the writer the revision of the Binet-Simon scale by F. Kuhlman, director of psychological research,

Minnesota School for Feeble-Minded was used. It was found, however, that certain tests of the Goddard revision were better suited for this class of subjects, and these were substituted.

Believing that perhaps many are not familiar with the nature and scope of these mental tests it is thought advisable to include in this article those most frequently used during this experiment, namely, those for the tenth, eleventh, twelfth and fifteenth years.

Before giving the tests, which are very simple and devoid of much technique, the examiner should thoroughly understand the tests and just what each one aims at. His attitude toward the subject should be one to inspire confidence and to obtain the greatest amount of attention from him. He should be urged to put forth his best efforts in doing the tests. No replies should be criticized, but always encourage the subject, letting him know that he is doing well. It is much preferable to have him alone in a quiet room in order to avoid any distraction.

TEN-YEAR TEST.

1. Counting dots.

   A card as shown in figure 1, plate 1, is prepared. The squares should measure 2 inches on a side. The arrangement of the dots, their sizes, and distances apart must be in the same proportion. Card is given to subject and he is asked to count the dots in each square to himself and to give the number for each square aloud. He is urged to work rapidly and accurately. The test is passed if the average time consumed in minutes for counting the dots of the 25 squares plus the average number of errors is less than seven.

2. Comprehension of easy questions.

   Ask, (*a*) "If you were going away and missed the train, what would you do?"

   (*b*) "What ought one to do when he has received punishment that he did not deserve?"

   (*c*) "Why does one excuse a wrong act committed in anger more easily than a wrong act committed without anger?"

   The test is passed if two are answered satisfactorily.

3. Drawing a design from memory.

   Prepare a card with a copy of design shown in figure 2, plate 1. Say: "I am going to show you this card for 10 seconds and then see how well you can draw from memory what is on it."

   The test is passed if one of the designs is drawn correctly and the other about half correctly.

4. Using three words in a sentence.

   Say: "Here are three words, money, river, and St. Paul. Make a sentence in which you use these three words." If he does not understand, give illustrations with other words. One minute and a half is allowed for an answer.

   The test is passed if sentence formed expresses either one idea or two separate ideas.

5. Form board puzzle.

   Use the form board pictured in figure 1, plate 2. The inside dimensions of the frame should be 3 by 4 inches. The dimensions of blocks should be as follows: $1\frac{1}{4}$ by 3; 1 by $1\frac{1}{2}$; 1 by $2\frac{3}{4}$; 1 by $1\frac{1}{2}$; $1\frac{1}{4}$ by 2. Arrange blocks as given in the plate and place before subject. Say: "These blocks will all fit into this frame and exactly fill it. See how quickly you can put them all in." If he succeeds in less than a minute and a half remove blocks and give a second trial. It is important that blocks should be removed from the frame before subject has a chance to note how the blocks are placed.

   The second trial is to determine whether first success was merely accidental.

   The test is passed if the time is less than a minute and a half for the trial that is counted.

ELEVEN-YEAR TEST.

1. Recognition of absurdity in absurd sentences.

   Say: "I am going to read you something that has some nonsense in it. Listen very carefully and tell me what you think of what I read." If he does not respond readily, read it a second time.

   (*a*) "A bicycle rider, being thrown from his bicycle in an accident, struck his head against a stone and was killed. They took him to the hospital, but they do not think he will get well again."

   (*b*) "A little boy said, I have three brothers, Paul, Ernest, and myself."

   (*c*) "Yesterday the police found the body of a young girl cut into 18 pieces. They believe that she killed herself."

   (*d*) "The other day there was an accident on the railroad. But it was not very bad. There were only 48 killed."

   One failure out of four trials is allowed.

2. Giving 60 words in three minutes.

   Say, "I am going to see how many words you can think of in three minutes. Say them out loud as fast as you can go all the time and I will count them and see how many you can get

PLATE I

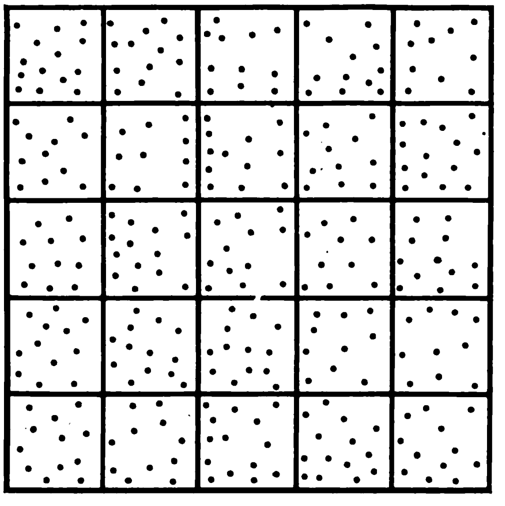

FIG 1

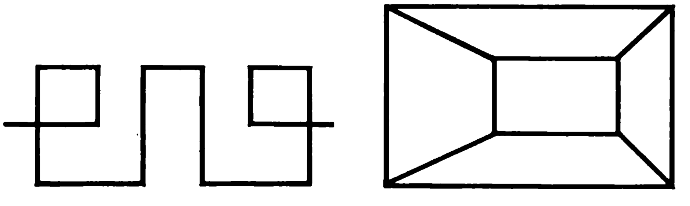

FIG 2

PLATE 2

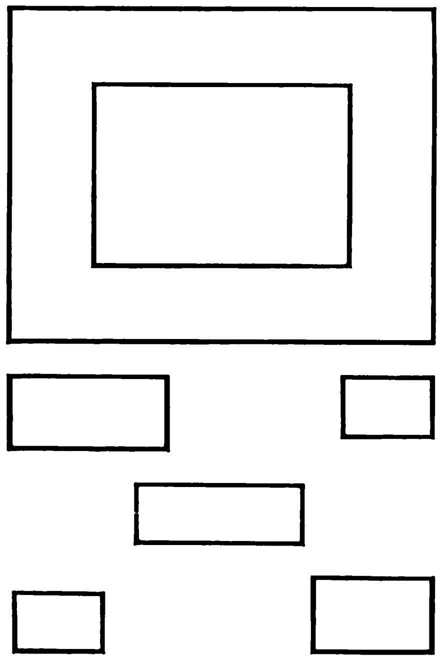

FIG - 1

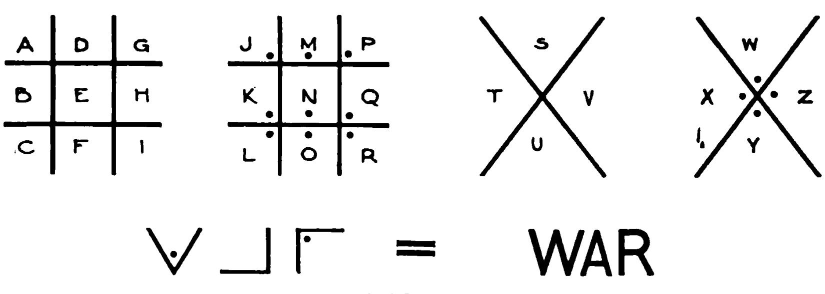

FIG - 2

in three minutes. Any words will do." Besides number of words given, the kind of words is also instructive. Some give only detached words, some only names of objects, others give series of related words, while still others give abstract qualities. The last are good signs of intelligence, and if the list includes very many such, 50 words or less may be accepted as satisfactory for passing the test instead of 60.

3. Giving definitions of abstract words.

Say, "Can you tell me what charity is?" then,

(*a*) "What is charity?
(*b*) "What is justice?
(*c*) "What is bravery?
(*d*) "What is revenge?
(*e*) "What is kindness?"

Three satisfactory definitions out of the five passes the test. The object is only to determine whether abstract meanings can be comprehended. A correct illustration is acceptable in place of a definition.

4. Words to put in order to make a sentence.

Show the group of words, one at a time, following precisely the arrangment given below and say, "Here are words of a sentence all mixed up. See if you can change them around so they will make a sentence and mean something." If he fails in two minutes, give him the following help:

We started—(pause) We started for the park—(pause) at an early hour.

(1) the for
at an early hour
we park started
(2) to asked lesson
my I have teacher
correct my
(3) a defends
good dog his
master bravely

The test is passed if two out of three are passed without any help. Allow two minutes or more if there is any indication of persistent effort.

5. Rhyming words.

Explain what is meant by one word rhyming with another. Illustrate. Then ask for as many words as subject can think of that rhyme with the words: (*a*) Day, (*b*) spring, (*c*) mill.

The test is passed if three words are found that rhyme with the word given in two out of three trials.

TWELVE-YEAR TEST.

1. Repetition of seven numerals.
   Tell subject there will be seven numbers given and for him to repeat them.
   Then give the following numerals:
   (*a*) 6–4–1–3–7–9–5
   (*b*) 8–2–5–7–3–6–9
   (*c*) 3–7–2–5–8–4–6
   One correct repetition out of three trials passes the test.
2. Opposites (Goddard).
   Ask subject to write opposites of the following words: 1, good; 2, outside; 3, quick; 4, tall; 5, big; 6, loud; 7, white; 8, light; 9, happy; 10, false; 11, like; 12, rich; 13, sick; 14, glad; 15, thin; 16, empty; 17, war; 18, many; 19, above; 20, friend.
   One illustration is allowed. The equivalent of 17 correct words must be given.
3. Repetition of one sentence of 24 syllables in all.
   Repeat word for word just as read the following:
   (*a*) "Men, it is necessary to work for a living, you must go to work every morning."
   (*b*) "I saw a pretty little dog out in the street. He had curly brown hair, short legs, and a long tail."
   (c) "When the train crosses the road the engineer will blow the whistle and the fireman will ring the bell."
   One correct repetition without a single error of any sort out of the three passes the test.
4. Problems of diverse facts.
   Say. "I am going to read you a sentence, but will stop just before coming to the end. Listen carefully and see if you can finish it as it should be."
   (a) "A person out walking in the woods stopped suddenly, much frightened, and then ran to the nearest policeman and told that he had seen hanging from the limb of a tree a .... (after a pause) a what?"
   (b) "My neighbor has been having strange visitors. He has received one after the other a doctor, a lawyer, and a minister. What do you suppose happened there?"
   Both must be answered intelligently to pass the test.
5. Resistance to suggestion.
   Prepare the following six cards, each $3\frac{1}{2} \times 9$ inches. First card: Two heavy horizontal lines, side by side, in the center of the card, the one on the left being 2 inches long and the one on the right $2\frac{1}{2}$ inches and the two separated by half an inch. Second card: Same, with the lines on the left and right $2\frac{1}{2}$ and 3 inches

long, respectively. Third card: Same, with the lines 3 and 3½ inches. Fourth, fifth, and sixth cards: Same in all three, the left and right lines being both 3½ inches in each card. For convenience, these cards may be fastened into a booklet, allowing the cards to turn easily and lie flat. Show the cards in order from first to sixth. For the first two cards ask: "Which is the longer of these two lines, left or right?" For each of the remaining two simply ask "And of these two?"

The test is passed if two out of the last three are answered correctly; that is, if he says they are the same. The object is to see whether the suggestion given by one of the lines being longer in each of the first three cards is resisted for the last three where the lines are the same length.

FIFTEEN-YEAR TEST.

1. Drawing the folds and a cut in a twice-folded piece of paper.

Take about a 6-inch square of paper and say: "Watch me fold this piece of paper and how I cut it. I am going to ask you in a moment to draw it the way it would look if I unfolded it again." Then proceed as follows: In plain view of the subject fold the square twice in the middle and in directions at right angle to each other. Then cut an equilateral triangle of about a centimeter from the middle of the closed side—the side showing only one fold. Then give the subject another square of paper of the same size and repeat: "Draw the way this piece of paper would look if I unfolded it again. First draw the folds." He may keep the folded paper and piece cut out in view, but must not touch either nor attempt to fold another. This test is difficult. If the drawing is made at once without hesitation, it may be assumed that he was already familiar with the test and had tried it before. In this case repeat the test by cutting the piece from the middle of the adjacent side, or by folding the paper from corner to corner into a triangle.

2. Code (Healy-Goddard).

The diagrams as shown in figure 2, plate 2, are to be constructed while the subject gives close attention. He notes the arrangement of the letters in alphabetical order vertically in the first and second and counter-clockwise in the third and fourth diagrams. Two and four differ from one and three in having a dot in each section. Once knowing the scheme, the letters may be left out and a cipher dispatch written by using part of the diagram in which the letter is placed in the key. Having made it perfectly clear, remove the key and have subject write "Come quickly" in this code.

In counting allow one error. Every wrong or incomplete symbol is an error.

3. Distinguishing between abstract terms.

Ask: "What is the difference between:

(a) Laziness and idleness?
(b) Evolution and revolution?
(c) Happiness and honor?
(d) Poverty and misery?
(e) Pride and pretention?

Three satisfactory replies passes the test.

Any response indicating that the essential difference is comprehended is accepted as satisfactory.

4. Give sense of selection read. (Goddard.)

Explain to the subject that you are about to read a selection to him, and that then you will ask him to tell you the substance of what you have read. He should give close attention. Read slowly the following:

"One hears very different judgments on the value of life. Some say it is good, others say it is bad. It would be more correct to say that it is mediocre; because on the one hand it brings us less happiness than we want, while on the other hand the misfortunes it brings are less than others wish for us. It is the mediocrity of life that makes it endurable; or, still more, that keeps it from being positively unjust."

It is correct if the subject gives the central thought in his own words.

5. Telling time if the hands of the clock were interchanged.

(a) Say: "If at 6:22 the hands of a clock were changed so that the small hand would be where the big hand is, and the big hand would be where the small hand is, what time would the clock show then?"

(b) Repeat the same for 2:46 o'clock. No watch or clock or drawing must be made use of. Allow liberal time. Both answers must be correct to pass the test. The discrepancy in the relative position of the hands when interchanged need not be recognized.

At the outset of these examinations there was some doubt as to the efforts which this class of subjects would put forth in doing these tests, it being thought that some might be indifferent as to their success. There was not a single applicant, however, who was not very keen to demonstrate the full extent of his ability.

Those given the tests were not chosen for this purpose, but every applicant, irrespective of his physical fitness for the service, was examined by the scale. A physical examination preceded the mental

tests. The results were very interesting and are summarized as follows:

Number passing the 15-year tests	89
Number passing only the 11-year tests	6
Number passing only the 10-year tests	1
Number passing only the 9-year tests	4
Total number examined by the scale	100

As will be noted, 89 of the 100 applicants passed the 15-year tests, and if the feeble-minded fall below that age, these many may be classed as normal. There were 11 whose mental ages, as shown by the tests, were from 9 to 11 years. If it is true that all adults of normal mentality should pass the 15-year tests, and this is the opinion of those having had extensive experience with the Binet scale, the above results are startling.

Of the 89 classed as normal, 52 were rejected because of a disqualifying physical defect, leaving 37 who were found mentally and physically desirable for enlistment. In but two of this number was the family history bad, one reporting his father as having suicided by hanging and the other that his father had been a hard drinker. Their education ranged from four years at common school to two years at a university; 18 having attended high school and 7 night school. Only 5 of this number were foreign born. In none of them would a mental defect have been suspected, all appearing normal and all would have passed as being of the average mentality of this class of men.

Those failing on the 15-year tests are shown in the following table:

Number.	Occupation.	Nativity.	School.	Family history.	Physical condition.	Actual age.	Mental age.
			Years.			*Years.*	*Years.*
1	Laborer	United States.	5	Negative	No defect	22	9
8	....do	....do	(?)	Unknown	Under age and under height.	20	9
27	Teamster	....do	7	Negative	Pes planus	22	9
32	Laborer	....do	1½	Parents tramps	Strabismus, amblyopia congenital.	20	10
33	Farmer	....do	4	Negative	Conjunctivitis	26	11
35	Flagman	....do	6	....do	Good	23	11
39	Ex-soldier	....do	8	....do	Hearing defective.	33	9
48	Plasterer	....do	1	....do	Mitral regurgitation.	22	11
54	Clerk	....do	7	....do	Hydrocele	22	11
60	Deserter, United States marines.	....do	4	Unknown	Good	22	11
70	Broom maker	....do	4	Negative	Defective vision	25	11

Physical defects, it will be noted, were found more frequently among these mental subnormals; only 3 of the 11 would have qualified physically for the service. A weak mentality was suspected in 4, because of their appearance, manner of talking, and behavior. The 3, however, with no physical defects would have passed as normal mentally. There were, therefore, in this group of 100 applicants 3 mental

defectives who were found physically fit for the service and whose mental deficiency would not have been discovered had they not been examined by the Binet scale. These 3 cases are reported more in detail.

Applicant No. 1 was a perfect specimen physically, yet his mental age was only 9 years. He was a glib talker. He had been doing common labor, and was living with his parents. Was able to read and write fairly well. Nothing in his appearance and behavior indicated mental feebleness. Because of his physical make-up he would ordinarily have been accepted for enlistment.

Applicant No. 35 would have qualified physically, but the Binet scale showed him to have the mentality of an 11-year-old child. He was living with his parents and had never left home for any length of time. Until a short time before applying for enlistment he had been employed as a flagman at a railroad crossing, but, as was learned later, had been discharged for inefficiency. This man would have been accepted had his true mental status not been revealed by the tests.

Applicant No. 60 was a deserter from the Marine Corps, who had been apprehended in this district and was brought in for a physical examination before being returned to the barracks. He was 22 years of age and had enlisted in the Marine Corps about a year before this examination. After two months at the training station he deserted, giving as his reason for doing so his fear of punishment for having overstayed his liberty. Several months after deserting he surrendered at the Duluth recruiting station. He was seen there by the officer in charge of recruiting, who, believing him trustworthy, furnished him with transportation and ordered him to report at the headquarters station to await his return. This he promised to do, but failed to keep his promise. He was not heard from again until a week before this examination, when he was arrested for vagrancy, and on his admission that he had deserted was turned over by the police authorities. The mental age given him by the Binet scale was 11 years, and the diagnosis of high-grade imbecility is justified. To have made this diagnosis without a previous history and only a short time for observation would have been practically impossible. Had his true mental condition been discovered at the time of enlistment he would not have been accepted. .

The results of this investigation warrant the opinion that the value of the Binet scale in determining an individual's mental make-up, as compared to observation and a simple reading and writing test, is beyond question. The diagnosis of feeble-mindedness in all cases failing to pass the 15-year tests would be manifestly unfair. An applicant's failure to pass all the tests for that year does not signify his inability to give good and efficient service in the Navy, for the

reason that these tests do not by any means cover the whole range of human abilities. It is doubtless true, though, that those who do pass the 15-year tests are of a higher grade of intelligence and would be more desirable men for the service. Adults with only sufficient mentality to pass the 9, 10, and 11 year tests certainly can not be considered desirable men for enlistment, and the diagnosis of feeble-mindedness in such men is justified. Yet such weak mentality may pass unrecognized, and if physically sound such men would be accepted for enlistment. The remarkably close estimate of an applicant's mental status given by the Binet scale and its superiority to a brief observation alone, make it of considerable value in recruiting examinations. A more extended use of the Binet scale in this field, including in the examinations some of the performance tests of Healy and certain ethical questions to determine an applicant's moral sense, is worthy of trial. From an experience with such psychological, performance, and moral tests a system of mental examinations for applicants might be devised which would greatly aid the examiner in detecting the feeble-minded applicant and prevent his acceptance for enlistment.

CONCLUSIONS.

1. Because of the great number of mental defectives at large, and owing to their inability to compete with normals in the struggle for an existence, many are likely to become applicants for enlistment.

2. The detection of the high-grade types of feeble-minded by the medical officer on recruiting duty is extremely difficult, because of the absence of any reliable previous history and because the time for observation is brief.

3. The Binet-Simon measuring scale for intelligence is regarded as being a most efficient method of determining quickly the mental status of an individual and is far superior to observation alone.

4. Of 100 applicants for enlistment in the United States Marine Corps tested by the Binet scale, 89 passed the 15-year tests and 11 were given a mental age of from 9 to 11 years by this scale.

5. Physical defects were more frequently found among those applicants failing on the 15-year tests, occurring in 72 per cent of those failing and in only 58 per cent of those passing them.

6. Three of the 11 given a mental age of from 9 to 11 years were perfect physically, and no mental defect was made evident by their appearance, behavior, and manner of talking. The ordinary reading and writing test would have been passed by them and they would have been accepted for enlistment.

7. The Binet scale in the examination of applicants for enlistment is practical and is a quick method of estimating their mental status, and therefore is an aid in the detection of mental feebleness which would otherwise pass unrecognized.

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LOST TRAILS, A PLEA FOR NAVAL MEDICAL BIOGRAPHIES.

By James Duncan Gatewood, medical director, United States Navy.

The ship goes on followed by an ever forming but rapidly disappearing wake, like things—men and events—and the memories of them. "Water leaves no trail," and time obliterates all things.

The broad highway is used by many, the side road by a smaller number, and the path by individuals. Even the burning of a hut may render the path useless; then nature spreads her green cover and hides the trail forever.

The marks that man, himself evanescent, leaves upon the surface of the earth are temporary. The road worn smooth by countless feet is there because of daily use, and he who carves his name on stone may live to see it showing the obliterating hand of time.

Much of the effort of each generation is expended in the work of preservation. But, the tower, the palace, and the temple disappear, and the past seems like an "insubstantial pageant faded."

Yet, the earth has always made its own record—permanent through all the ages. Probably no hour passes without a corresponding record, and certainly the great globe never turns on its axis in forgetfulness of the record it has continued to make from the day of its birth.

That record may be in the form of the most delicate leaf or fern on the slate between deposits of coal in mountains which are themselves enduring monuments to the earth's activity; or it may be a bowlder, rounded and transported during the glacial period; or some prehistoric skull found in the loam of ages. And in more recent time, coming well within the history of man, is the record of modern man and his habitations, made by the great Vesuvius which in its throes covered and sealed as if forever the gay and radiant city of Pompeii.

But, while man with pick, shovel, and barrow, and with steam, electric, and pneumatic drills, seeks with intense interest to expose and read the earth's wonderful record of the ages, and to take out and utilize its secret stores of valuable material, his longing for

individual immortality leaves him discontented with the impersonal and materialistic relics of bygone days.

He looks at the mass of quartz, containing in its limpid substance the drop of water segregated when the waters under the earth were separated from the waters above the earth, and thinks of life with its ideals, its hopes and aspirations—the dreariness of a world before the dawn of life.

He holds with equanimity the skull found in the earth's prehistoric beds and feels that the bare skull of any nameless man gives little idea of the place of the individual in his race. Yet, how tremulous would be those same hands if they held the high domed head of Cæsar, or how intense would be the gaze into the vacant orbits of him who died at St. Helena and lies entombed within the great individual memorial of our times.

The history man makes individualizes, glorifies, and—condemns. It is a record that associates memory of individual or of deed with the place or inanimate thing it hallows and vivifies. The sword of the conqueror is guarded as a treasure, the simple signature of the great is handed down to posterity, and the place of glorious deed is adorned with statue of hero and figure of ideal.

But the record made by man reflects his many imperfections. Indeed, it had to await the development of the maker, and so thousands of years fill the period of prehistoric time. And when the written word started on its mission in the affairs of human life, and the day of written history arrived, the historian selected those things for record that made a stir in his world—that appealed to the mind of his age. Men, vanishing as individuals and turning to the powers of light and darkness, wrote words of worship at the time they erected solemn temples. Men, passionate and loving splendor, loot, and patronage, wrote of carnage and power. And history lingers in long account of those clothed in purple and carrying fire and sword throughout vast dominions—ambition as the strand upon which events were strung—and men as puppets.

Since printing was utilized the record has grown in leaps and bounds, but, whether written or printed, mingled throughout it all are pride of opinion, prejudice of race, perversion of fact, and country above right. So that he who seeks to study the influences that led to events and molded the destinies of nations, to analyze the motives and characters of the chief actors, and to construct a true picture of the time, finds that the precious metal can never be entirely freed from the alloy and that, as man is ruled in part by pride and prejudice, so his history must ever be a mixture of the false and the true—and false as much by sins of omission as by those of commission—lost trails and false trails.

The mixture of the false and the true, so far as so-called facts are concerned, and the interpretations of them, even more defective, constitute a mass of material known as history which is now so extensive that even the student making a specialty of the subject can find time for travel along the broad highways only, except in restricted regions set apart for special study and which he loves to explore by side roads, paths, and little known or hard found trails that sometimes lead to lost mines of wealth in forgotten or undiscovered lore.

For the general student, the highways and bypaths of history are spread out much as the geographical maps to which he has ready access. In such maps the two hemispheres are portrayed on a minute scale, just as a history of the world in one volume, and whether the succeeding maps delineate the United States or some other country on a much larger scale depends upon whether the student is American or a resident of that other country. The French boy may live to man's estate without fully realizing that any country is larger than his own. His geography is devoted to maps of his own country and the small map of the United States is occupied chiefly by the city of New York. And his history is largely the glorious history of his nation, with some information of the Greeks and Romans in the days when Greek and Latin were living tongues. His knowledge is interwoven with and conducive to patriotism. To the French or English boy France or England is everything, and to the American boy the United States is most of the world. It is a history of the world in one or more volumes and the history of one's country in greater volume. All of which is strictly in accord with human nature wherever found. Even charity begins at home.

But, however voluminous may be the history of one's own country, it is probably quite practicable to construct as voluminous a record of one's own county. It is all a question of character of material—the one dealing with national affairs and the other with local affairs—the one containing material interesting to the many and the other to the few. The hand that rocks the cradle rules the world but none lives in history on that account unless the cradle contained something that grew to national prominence, but the hand that rocked the individual cradle lives in the individual's memory and has a place in his history that should be more highly treasured than any volume on the great women in history who may have been famous or infamous.

Clearly the value of a fact should not be measured by the amount of attention it attracts. A murder, committed in some specially atrocious manner, may excite extensive comment, and the fact, as has been the case very often, may live in history, but its value is negative in great degree. And history contains very much about

the notorious—too much. Indeed, the tendency to advance the morbid has often led to ascribing infamous acts to the guiltless.

It is generally conceded that the value of a fact depends upon the number benefited by the knowledge it proclaims, or upon the greatest good to the greatest number; but that generally acknowledged truth is difficult of application when it is desired to allot credit in history. The act of one individual often expresses the thought of another. There is a power behind each throne. Besides, the unrecorded influence, even in domestic or home life, can mold or perfect a character that may live forever on the pages of history. Perhaps even an obscure schoolmaster may be more or less responsible for the career of him who quickens the destiny of a nation.

And in any organization, such as a navy, the word or deed of an individual may form a glorious tradition in that service, an encouragement to daring or devotion to duty that becomes a living and sustaining force in the hour of trial.

"I have just commenced to fight," "Don't give up the ship," and "We have met the enemy, and they are ours," are expressions which, while well known to the many, exert their full influence upon the personnel of the service in which they were uttered, setting a standard in naval life for all time and greatly helping to form the ever present and wonderful inspiration that comes from the flag afloat to those serving under it.

Yet, those expressions gain their influence largely from the dramatic circumstances under which they were uttered. From an historical point of view they live because they came from sources that had the advantage of position at times of national importance and amid surroundings of battle. They are like the "Veni, vidi, vici" of Cæsar. They emblazon "the paths of glory" that "lead but to the grave." However, they belong to naval history and are priceless in their influence upon naval life. They are read with pride by every citizen, but they are treasured in the hearts of those who are awaiting the call to quarters.

The history that appeals or should appeal with greatest strength is that which may be repeated in our own lives, or relate directly to our own affairs. The memorable acts of those gone before who occupied positions similar to our own should ever be an inspiration to us. And it is given to the living to record the memories of the dead, but it is a duty sadly neglected. It is a duty owed not so much to the dead as by the living to themselves. The dead are not benefited, but the living. The man in whom the love of duty has been stronger than the love of life has furnished an example that should not be allowed to die. And which should be considered of more importance to the members of the Medical Corps of the Navy, the history of the world

in one or more volumes or a history of those men of that very corps whose "love of duty has been stronger than love of life," and who, occupying positions similar to our own, have had the nobility of character and the courage and the opportunity to do the things that belong to the high plane of human endeavor?

Yet one searches in vain for such a record—such a history. Men now in the upper grades of the corps have never heard so much as the names of many of those, who, once in the very places now occupied, did their part in a way to excite the admiration of their contemporaries, and to exert an influence, now lost, that should be a priceless part of the heritage of the corps.

Perhaps there is a growing tendency on the part of members of the Medical Corps of the Navy to so focus their minds upon one essential factor of efficiency in naval life as to allow the other essential factor to become as a dim outline in the field of vision—to consider themselves as belonging exclusively to a medical body rather than to a naval medical corps—to believe that as the efficient performance of purely medical duty is essential, there is no other naval medical duty that is essential. But what is more common in life than concentration upon one essential factor to the exclusion of others equally essential? Even in the medical profession itself a specialty too often means domination to the point of blindness along other essential lines. And so it can be in naval life—the naval idea dominating to the point of forgetfulness of the human side of life in handling men or cultivating the spirit that makes for naval discipline and efficiency, or, on the contrary, purely professional domination to the exclusion of those factors that make for naval supremacy—the civil professional view carried into naval life to the exclusion of the naval or military conception of efficiency. And in this necessary adjustment what can be of greater value than the example of men who, dead, should now be living in the annals of the corps? It is the living who are benefited when they record the glorious memories of the dead. We have all grown out of the past and many of our inspirations are derived from that land of memory that can be made to yield fruit for all time. Life of the present is always a continuance of life of the past, and fortunate are those who are able and willing to find in the history of the past something of value in relation to the present. The Medical Corps of the Navy is an essential part of the Navy, and the life of the Navy has been continuous from the day of the *Richard*. And as the corps never dies so its history should ever be alive.

In regard to this naval idea in relation to the Medical Corps, the naval medical officer is in no danger of forgetting that as a medical man he is the product of conditions in civil life. Proud must he

ever be of those great halls of learning and of the wonderful ability of those who struggled to keep him in the path of knowledge. And further probably of all officers regularly attached to ships, he recognizes that he must be most quickly responsive to professional advances on shore. The strength of the corps in its medical and surgical life must ever be in direct proportion to the intimacy of its association with the medical thought of the splendid profession to which each of its members belongs.

But that fact should in no degree take away anything from his position as an officer in naval life. In fact the more quickly he utilizes the real advances in civil life the greater should be his credit with all associates in naval life. And naval medical biographies will serve to show that men even recently from civil life have acquired naval methods and fought their way to naval recognition when entrusted with important naval independent duties.

In this connection it may be worthy of note that even relatively uneducated men soon fall into naval methods and become dependable in a naval organization. Time and again new crews have been quickly trained to do remarkably good work, provided that training has had the backing of a nucleus of older men. Young men have fought the battles of the world. And civil life has produced the noblest minds of history and, what is very notable, the greatest advances in naval equipment and consequently in naval efficiency. Yet it is common knowledge that discipline is essential for naval success.

There is a wonderful degree of adaptability resident in any intelligent people. The love of the flag rapidly becomes more potent in intimate association with it, and much of the work done in the construction of the ship itself or on the ship, whether by officers or enlisted men, is quite similar to that commonly performed in civil life, including the merchant marine. All officers of the Navy are from civil life, and it is difficult to understand how any one in the naval service can fail to realize that the very root of its advance is deeply embedded in the fertile minds of the adventurous and inventive ones leading the march of progress in all civilized nations.

The lives of the old navigators, Columbus included; the inventive genius of Ericsson, by which naval construction was revolutionized; the use of electricity in motors, lighting, and wireless; boilers, engines, propeller, and turbine; rapid-fire guns; armor; and a number of other things essential in naval efficiency, including the naval tactical war game itself, prove this as directly as the surgical instruments, medicines, and textbooks utilized on ships. A navy reflects the spirit, skill, intelligence, and progressiveness of a people, and members of the Naval Medical Corps can always be as proud of the source

of their medical education as of the source of their naval education in an atmosphere charged with the glorious traditions of the Navy, which they have helped to create.

And it is interesting to note the responsiveness of memory to even the simplest influence. A song unheard for many years may serve to recall days of the long ago, or a little trick of manner or speech, perhaps in a stranger, may suggest a personality that once was a factor in one's life. Certainly the hearts of men are quickened and their emotional natures awakened, even in mass, by some simple tune of auld lang syne, and what is more stirring than one's national anthem heard in some foreign land—every note is charged with memories, and strong men lose their wonted calm.

Each effect has a cause, but so many are taught to believe that each cause has substance. An age of science begets a materialistic view of life. Industrial advance includes the use of material in the form of machines designed to do even the most delicate and complicated varieties of work until man himself seems to be regarded as merely a machine and all human ills as disorders dependent upon adverse material environment. The essential recognition of the value of the removal of cause in occupational disease, and of the destruction of the vital causes of disease, too often leads to a concentration of thought that excludes appreciation of those unsubstantial influences that make life worth while, that sets standards which can not be seen and measured by microscope, or valued in money, that prevent all creeds from becoming mere formulæ, and that make the spirit of life, uplifting the mind and holding man above meanness and vice. There is a vital resistance of the body that has to be considered, as well as the destruction of the vital cause of disease, if health of body is to be preserved, but there is also a resistance of that something in man that should hold him spiritually above all sentient beings, and that must be cultivated, enlarged, and strengthened, or selfishness and viciousness reign. Moral degeneracy is a disease found in the palace and the hut.

And he who brings into his life knowledge of the lives of the truly great, who learns to be able to follow them in thought to the supreme moments of their existence, does much to strengthen his own life. He links himself with the past and heightens the value of the present and future. He learns that no man should be judged by his hour of weakness, but by the height he can rise above other men in thought and act. And in that "land of memory" he finds much of value to aid in his search for happiness and something to help in accepting some answer to the eternal question, "What is truth?"

Longum iter est per precepta, breve et efficax per exempla.

ABSORBABLE ANIMAL LIGATURES

By T. A. Berryhill, medical director, United States Navy.

Soon after I took charge of the Naval Medical Supply Depot, Brooklyn, I found that to inspect intelligently the catgut ligatures I would have to inform myself in regard to their manufacture and to the quality of the material used, as I noticed there were great differences in the physical properties of the gut supplied by different dealers.

The history of the use of animal absorbable ligatures and sutures is very interesting.

The Arabian writer and surgeon, Rhazes, of Bagdad, A. D. 900, tells of the stitching of wounds of the abdomen with strings of the harp, which were made of the twisted intestines of the sheep, and Albucasis describes the stitching together of wounds of the bowel with fine thread made from the intestines of an animal. In more modern times Dr. Physick, of Philadelphia, introduced the animal ligature and claimed good results from it. He used strips of chamois leather rolled on a slab to make them round and hard. He believed these ligatures were better than silk, as they were absorbed by the fluids of the body after they had performed their function of obliterating the artery, and it was not necessary to be continually tugging at the end of the ligature to see if it was ready to come away. Although Dr. Physick used these ligatures from 1806, he did not publish his results until 1816. Many surgeons in this country used them, as did Sir Astley Cooper in England. They fell into disuse but were again used in 1830 by Dr. H. G. Jameson, of Baltimore, who gave credit to Dr. Physick for their first use. Dr. Jameson seemed to be a very clean operator, for he had many cases of union by first intention. Later animal ligatures fell into disuse and were not much used until Lister demonstrated that suppuration was caused by the introduction of germs from outside the body and that if there were no germs there was no suppuration and inflammation. This discovery allowed the use of aseptic animal sutures and ligatures, and Lister used catgut which had been prepared by soaking in a solution of carbolic acid. In 1870 Dr. H. O. Marcy, of Boston, a student under Lister, in operating for strangulated hernia, first used the buried animal suture. His success was so great that his method was taken up and is now used all over the world. Dr. Marcy first used catgut, but having the unfortunate experience of some of his wounds suppurating he, after much investigation, began using tendons from the tail of the kangaroo, and these are now used by many surgeons in the operation for the radical cure of hernia.

During the last 40 years many different substances have been put forward as making ideal absorbable suture material. The tendons from the tails of the rat, squirrel, opossum, kangaroo, and from the

legs and fascia lata of the moose, deer, cow, etc. These have now all fallen into disuse with the exception of the kangaroo tendon and catgut. The best kangaroo tendons come from the tail of the small kangaroo, or wallaby. The tendons from a freshly killed animal are dried in the sun and are not liable to become contaminated with germs. They must be kept dry during shipment. The bundle of tendons is soaked in a solution of corrosive sublimate until soft when they can be separated and cleaned and dried straight on sterile towels. They are then chromicized and put up in boiled linseed oil or chloroform. The objections to the kangaroo tendon are the expense, the comparative scarcity of the raw material at present, and the fact that less than 10 per cent of the tendons are of a size small enough to be used. The manufacturer then splits up the coarse tendons into the proper sizes. This is not entirely satisfactory as the split tendons are rough, show weak spots, and are apt to split during use.

The kangaroo tendon is principally used as a suture in the radical cure of hernia, but probably has no advantage over properly chromicized catgut.

The catgut of commerce is obtained from the small intestines of the sheep. The best is made probably in Italy and Germany. The American brand seems to be poorly twisted, has not the tensile strength, and is very rough; at least it is so in those samples I have examined.

Each manufacturer seems to have a different way of preparing the intestines. Some place the guts, after separating them from the mesentery, in a tub of water and allow them to decompose, after which they are split into ribbons and scraped with knives to remove the mucous, muscular, and serous coats, leaving only the connective tissue coat. Prepared in this way there are left more or less particles of muscle and membrane which cause a great difference in the strength of the finished gut.

One of the best methods I have seen described is as follows, and should produce a product comparatively free from germs:

After being freed from the mesentery the gut from a freshly killed sheep is placed in cold water to take out the animal heat and check putrefaction. It is then split into two portions by means of a round, blunt-pointed piece of wood having razorlike blades attached to its periphery. The gut is drawn over the instrument and split into two parts. The split gut is then placed in a tub containing a 1 per cent solution of sodium bicarbonate. It is then taken from the sodium solution and scraped by means of a machine, consisting of a set of rollers which draws the gut between a smooth cylinder below, and a rapidly revolving paddle wheel above, the latter revolving in an opposite direction to the movement of the gut. The ends of the blades of the paddle wheel are provided with flexible leather flappers which

beat and scrape the side of the gut uppermost. The gut goes from the scraping machine into fresh sodium solution. This process of scraping and soaking in the sodium solution is repeated six or eight times till both sides of the gut are cleaned of everything but the submucous connective tissue. It is then bleached and disinfected by being placed in a solution of hydrogen peroxide, one-third to water two-thirds, to which has been added sufficient sodium bicarbonate to render it neutral. The solution is heated to 90° F. and kept at this temperature for six hours, after which the gut is ready for twisting. Prepared in this way the gut is free from muscle, mucous membrane, or peritoneum. The gut is now in thin strips varying from a quarter to one inch in width. Chemically it consists principally of collagen which upon boiling with water is turned into gelatine. In addition there are proteins and albuminoids not convertible into gelatine and small quantities of fats, resins, waxes, and inorganic matter. On account of the adhesive quality of the prepared gut it can be twisted into an almost homogeneous strand.

The strips are now placed in the twisting machine, a number of strips being twisted together according to the size of the strand to be produced. The twisting machine consists of a stationary hook to which one end of the gut is fastened and a hook in the center of a small wheel to which the other end is fastened, the gut being under slight tension. The wheel is rotated by means of proper machinery, until the gut is twisted the correct amount. After twisting the strand is dried under tension. The gut is then sandpapered to remove the rough surface and rubbed down with emery paper. The dust is removed by washing with water, after which it is dried, gauged, and made up into rolls for market.

The ideal suture is one absolutely sterile and which should remain sterile until it is absorbed. It should be strong and flexible and thoroughly absorbable. There is no doubt that catgut can be made sterile, but as it does not, apparently, always remain sterile until absorbed, the minds of many surgeons have been working to produce a gut which would do so. With sterile catgut much successful work is done by competent surgeons, but the fact remains that no matter how clean the operation may be there is a chance for germs to enter the open wound from the air and infect the exudate caused by the irritating presence of the catgut. Were it possible to impregnate the gut with an antiseptic which was nonirritating to the tissues and which would act during the whole time the catgut was being absorbed, it is probable that germs gaining entrance would be killed and the danger of suppuration minimized.

Many chemicals, organic and inorganic, have been put forward but have not been universally adopted, most surgeons still sticking to the plain catgut, trusting to their clean technique for success. The

iodine catgut has been found to lose its iodine sometimes within six hours after using. Then again it will not keep for any length of time, becoming brittle and thus not being available for naval use. The organic salts of silver have been used, as have mercuric salts and carbolic acid. None of these seems to meet the requirements, as the antiseptic is removed from the catgut by the fluids of the body before the gut is absorbed. Something in the form of methyl violet (pyoktanin) impregnated gut may eventually be used, as this seems to come nearer meeting the case than any yet suggested. One of the drawbacks to pyoktanin gut is that it can not be chromicized.

In regard to the tensile strength and flexibility of the gut it is not necessary for it to be excessively strong, as it requires but little strength to bring the cut edges together sufficiently for their healing. In fact, too much pressure is objectionable as it tends to cause strangulation and thus retards healing. Also, when too much force is used, it is apt to pull the knot loose when the gut is soaked in the fluids of the body and becomes swollen and slippery. Then, again, if the second knot is sharply jerked the gut is apt to break at the knot.

The fat should be removed from the gut, for it has been found to cause serious irritation to the tissues; it prevents, to a certain extent, the entrance of the germicide when chemical sterilization is used; it makes for brittleness in the finished product and may cause cooking of the gut in its own fat when dry heat is used. If the gut is to be sterilized by dry heat every particle of water must be removed, otherwise the collagen is converted into gelatin and the article ruined.

There have been a great many methods put forward for the sterilization of catgut which divide themselves into two classes, chemical and dry heat. Among the chemical class may be mentioned the following watery solutions: Formalin, corrosive sublimate, biniodide of mercury, carbolic acid, and pyoktanin.

Formalin (Vollmer) is a failure, as exposure to the solutions long enough for sterilization destroys the tensile strength.

Sublimate (Bergmann) will kill germs and spores in watery solution if it remains long enough and reaches the center of the gut, but as it coagulates the albumen on the surface it may be doubted whether it would reach spores embedded in the strand. The same can be said of the biniodide solutions.

Carbolic acid has little effect upon resistant spores.

Iodine (Claudius) is probably the best chemical for safe sterilization, but the gut becomes brittle after a short time.

The efficacy of sterilization by chemicals is rendered doubtful from what is known concerning the action of certain germicides.

It is known that carbolic acid and salts of mercury owe their germicidal effect to the fact that they unite with the protoplasm of the bacteria forming either carbolates or double mercurial salts and thus

render them inert, but not insuring their certain death, and in the presence of certain reducing processes, as, for instance, the action of the hemoglobin of the blood, a reduction may take place to such an extent that the germs may again resume their life activities.

Sterilization by heat is effected in various ways by the different manufacturers.

Boiling in water would the easiest way to sterilize the gut, but this is impossible on account of boiling water changing the collagen into gelatine and destroying the material. To apply the necessary degree of heat the gut must be prepared in such a way that the collagen is not changed into gelatine, or it must be heated in a fluid which does not allow the change, or which is free from water. It must never be lost sight of that when heated in a water-free fluid the character of sterilization is that of dry heat only and requires the same degree of heat for effective sterilization as is needed in dry heat sterilization without a fluid.

By Hofmeister's method the gut is soaked in a solution of formaline, which causes a hardening of the collagen so it may be boiled for a short time. The sterilization is only on the surface, for if the boiling is continued a sufficient length of time the water penetrates the interior of the gut and it is destroyed.

Elsberg boils the gut in a concentrated solution of sulphate of ammonia which prevents the collagen from being converted into gelatine. It is boiled at a temperature of 226° F. It stands boiling well, but is only a surface sterilization, for if the water in the solution penetrated the gut it would ruin it. It is only a dry heat sterilization at an inadequate temperature.

Boiling in absolute alcohol is another case of dry sterilization at a too low temperature.

Hot air (Reverdin) can be used if the gut is absolutely free from water. The gut will stand a temperature of over 165° C. This gives a dry and rough gut which is absolutely sterile.

Of all the methods with which I am acquainted, and one which theoretically and practically gives a sterile gut, the method of Koenig, by boiling in cumol, is the best. Cumol is a coal-tar product which boils at 168° to 170° C. It has been found that catgut can be placed in this fluid and the temperature raised to over 165° C. without losing much of its tensile strength. In this method both the cumol and gut are rendered water-free before beginning sterilization. The gut is gauged for size, cut into strands of different lengths, and placed in glass test tubes. These are put into racks and immersed in the cumol in the cumol sterilizer. In heating the cumol sterilizer it requires about 12 hours to raise the temperature to the necessary 165° C. When this degree of heat is reached it is kept there for one hour, when it is allowed to cool. This means that the gut is

subjected to a heat of about 150° C. for from 9 to 12 hours, sufficient in one application to kill the most resistant spores. This sterilization is repeated on the following day, and it is certain that no organism could survive. The cumol not only allows the application of great heat to the gut, but also deprives it of its fats and waxes and destroys the remnants of muscle and membrane which may have escaped the scraping machine. The gut in the tubes is then washed in sterile chloroform, which removes the cumol. The tubes are then half filled with chloroform or absolute alcohol for preservation purposes and sealed by the blowpipe. The sealed tubes are again sterilized under 18 pounds steam pressure on two succeeding days. Samples are tested bacteriologically for sterility, after which they are ready for use.

I have described the cumol method so minutely because I believe it to be the best way to prepare surgical catgut. It produces an article sterile beyond question, which is sufficiently strong and keeps well.

The absorbability of plain catgut depends upon the size of the strand and the activity of the tissues in which it is used. Tissues having a good blood supply absorb catgut with great rapidity and the wounds in such tissues also heal very quickly. The size of strand to use will depend, therefore, upon the kind of tissue to be sutured. In the skin a rather large size should be used on account of the excessive activity of its deeper layers. In fatty tissues a very small-sized plain gut should be used on account of fat necrosis sometimes taking place when a large sized gut is used. In muscles plain gut should be used of a size according to the results desired. In suturing tendons and fascial tissues, which have a poor blood supply, something more resistant than plain catgut is needed and in the chromicized gut we have a material which answers these indications. In this connection I see no reason why, in the interest of more elegant surgery, the smaller sizes of chromicized catgut could not be used in many places where the larger sizes of plain gut are now employed. Certainly the violence to the tissues would be less. The chromicizing of catgut is an adaptation of the chrome process of making leather, and the gut is really turned into leather to a greater or less extent according to the desired absorbability.

The best manufacturers turn out a product which is designated 10, 20, 40, 60 days, etc. This means that the gut will not be absorbed in less than 10 to 60 days. Some manufacturers do not mark the gut with the minimum number of days, claiming no one can tell when the gut will be absorbed. This is an error, for the more fully the gut is turned into leather the longer it takes to be absorbed. It is true that in some tissues a 20-day gut may be absorbed in 12 days or less, but in the normal thigh muscle of a rabbit this gut will not be ab-

sorbed in 20 days. Then, too, although the date is relative, the surgeon will have more knowledge of what he is using when the days are marked on the tube and he can select according to his needs.

In the manufacture of chromicized catgut sutures the most common practice is to immerse the gut, under tension, for varying lengths of time, in a solution of potassium dichromate ($K_2Cr_2O_7$). On removal from this solution it is allowed to dry in a dark place, as any exposure to sunlight will cause an oxidation of the gut and weaken it. Even when kept away from sunlight the gut gradually deteriorates, besides causing irritation to the human tissues, unless the contained chromium is rendered insoluble by a reducing agent. Many complaints have been made by surgeons because of weakness and irritating effects of chromicized gut not properly prepared.

The method now used is so successful that the chromicized gut will stand sterilization and exposure to sunlight without harm and is free from irritating qualities. It is easily prepared and the time of absorption regulated for 10, 20, 40 days as required. The time of treatment has been so carefully investigated that, by means of standard tests, the absorbability can be accurately determined by immersing in water at various temperatures.

The process of manufacture is as follows: The gut, selected as to gauge, is chromicized for a given time in a solution containing 6 per cent potassium dichromate and 3 per cent of hydrochloric acid. The time of treatment depends upon the desired rate of absorption and varies from one-half hour to three hours. The chemical action produced is probably as follows:

Potassium dichromate ($K_2Cr_2O_7$) may be considered, for this purpose, as a compound of the normal chromate ($K_2Cr\ O_4$) and chromium trioxide (CrO_3). Gut so treated is sensitive to sunlight and on exposure the yellow color changes to green, showing the reduction of the trioxide (CrO_3) to chromium sesquioxide (Cr_2O_3) or when water is present to its corresponding and probably colloidal hydroxide ($Cr_2(HO)_6$). For every molecule of sesquioxide or hydroxide so formed three atoms of nascent oxygen become available. Unless some easily oxidized substance or reducing agent, such as a sulphite, is present the gut becomes oxidized and thereby weakened or rendered unservicable.

As in the chrome process of tanning leather, and many photomechanical processes depending upon the behavior of chrome-glue mixtures on exposure to light, catgut becomes nonabsorbent of and insoluble in water in the presence of trivalent chrome compounds, such as the sesquioxide or hydroxide formed by the action of reducing agents or sunlight; while the hexivalent chromium compound, such as the trioxide, does not so affect nitrogenous bodies. The sesquioxide and the corresponding hydroxide are insoluble in

water, while the trioxide or dichromate itself, being freely soluble, will cause irritation to the human tissues. It is therefore necessary that chromium in the gut should be in an insoluble form and free from the soluble salts, and that this condition should be brought about without the possibility of oxidation of the gut. These conditions are procured by drying the gut, after treatment with the solution of potassium dichromate, in the dark. The tanning is then completed by immersing in a solution containing 18 per cent of sodium bisulphite, which changes the chromium in the gut to the insoluble trivalent compound. The gut is then thoroughly washed and neutralized, thus getting rid of the soluble hexivalent compounds which would sooner or later ruin the product. The now chromicized gut is suspended, and by means of weights allowed to dry in a state of tension. When dry the sutures are sorted for the different sizes, placed in open tubes, and subjected, in the cumolizer, to a temperature of 165° C. for one hour, on two days; washed free of cumol by means of chloroform; the tubes half filled with chloroform or absolute alcohol; sealed and again sterilized with steam under a pressure of 18 pounds to the square inch, for one hour, on two days. Each lot is then tested to determine its time of absorption, tensile strength, and sterile condition.

In inspecting catgut sutures at the Naval Medical Supply Depot, Brooklyn, the following points are inquired into:

Sterility: The gut is tested bacteriologically at the Naval Medical School whenever it is considered necessary.

The boiling test: Several tubes of gut are placed in water, in a suitable vessel, and brought to a boil, which is continued for 15 minutes. This is considered necessary because many surgeons disinfect the outside of the tubes by placing them in the sterilizer with the instruments. This is more efficacious than putting them in an antiseptic solution, for should the tube be greasy the antiseptic may not kill the germs on its outside.

The tensile strength is determined by the pulling machine. Raw gut should stand strains as follows: No. 0, 20 pounds; No. 1, 25 pounds; No. 2, 33 pounds; No. 3, 40 pounds. A loss of strength of 10 per cent from the above is allowed for sterilized gut.

The gut is gauged on a Brown & Sharpe wire gauge. No. 000 should equal 32; No. 00, 28; No. 0, 27; No. 1, 26; No. 2, 24; No. 3, 23; No. 4, 22; No. 5, 21; No. 6, 20. Some manufacturers pay little attention to the accuracy of the sizes of their catgut, but it is some importance to the surgeon to have the size designated and to always have the same size shown by the same number.

The absence of fat is determined by sharply bending the gut. If it shows a very white mark at the bend it is a sign that it contains fat.

Fully appreciating the responsibility resting upon me to furnish to the surgeons of the Navy sutures and ligatures which are above criticism, I have decided to accept no catgut that is not prepared by a process which I know will produce a material which answers all requirements. I believe that we have such a material in gut prepared by the cumol method and that surgeons getting infection in their operation wounds are not justified in accusing such gut with being the cause, if the gut is not infected after being taken from the tube.

A MODEL CAMP HOSPITAL ASHORE.

By EDGAR THOMPSON, surgeon, United States Navy.

The sanitary problems of a camp hospital ashore are mainly of interest and demand particular attention when the hospital is of a temporary and emergency character, and this is generally the kind we will have to set up and maintain. When a state of permanency has been reached all sanitary imperfections will have been solved by the expenditure of labor and money. A permanent treatment camp should in nowise differ from an ordinary hospital, where the sanitary situation is really very simple and consists mainly in passing your sewerage to your neighbor lower down the hill or river and letting him attend to it as his problem.

As our normal life is afloat, the very fact that we are ashore indicates some unusual reason, with the idea that all the men so detailed are needed for military work and every effort should, therefore, be made to return the inmates of the camp hospital to duty as soon as possible; and special effort should be made to keep them from acquiring a new disease while in the hospital.

The general location of the hospital should be at a considerable distance from the military camp, if there be any. It should be far enough to subdue all the noises incident to camp life, especially those of the early morning, when the patients should be in the most refreshing part of their sleep.

This distance will also make the hospital less of a loitering place, and the risk of accidental distribution of infection by contact or otherwise is diminished. The hospital should be across the wind from the main camp so as to have a wind barrier between the two.

I think the ideal situation for a camp hospital is on a lee shore. In such a situation some sanitary problems solve themselves. The air is pure; it will not be dust laden and will be more or less washed, and possibly, as has been claimed, a considerable amount of ozone will be developed by the wind and water friction. If a lee shore can not be selected the next best place is a large open area.

For reasons that I will give later the site should be as barren as possible of trees and vegetation in order not to produce or harbor any pest that flies.

The company street should be in the direction with the wind. This is important for several reasons. This arrangement will cause the tents facing the street to present their sides to the wind, and the flapping of the tent flies will be very much less than if the air current passed between the tent and fly. The constant flap, especially at night, is very disturbing, and this striking of the fly keeps the dust in the tent in constant motion. Another reason is that dust will be blown by the tents and not into them as it would be if the open front presented to the wind. Another and important reason is that flies and mosquitoes will not be blown into the tents. It is practically impossible for mosquitoes to fly into the wind and it is difficult for flies to do so. When they are caught in a breeze they tend to drift passively.

If the day and night breezes differ in direction the company street had better be laid out in line with the night wind, as the prevention of the entrance of mosquitoes is the most important consideration.

The subject of tent floors seems a simple one and not worthy of much thought, but in truth they are at times very unsanitary and worse than no floors at all. As built, the space under the floor is too narrow for proper inspection and policing. This space is a real home for mosquitoes, woodlice, ants, fleas, rats, mice, crabs, etc. I have always seen this demonstrated when a camp is broken up. This narrow space is also more or less a garbage can for each tent. It is remarkable what can be seen when a tent floor is upended after a few weeks of use. The usual list is as follows: Socks, underwear, hats, shoes (all old and dirty), fruit peelings, tooth brushes, remnants of food, bottles, and most of the sweepings from the tent.

For a temporary camp a wood floor is not necessary, and the earth can be made very hard, clean, and sanitary by periodic wettings down with kerosene and water. If the floors are used all the ends should be boarded or screened in order to prevent anything from gaining entrance or being put under the floor.

The administration and working tents should be placed in the middle of the establishment, with the very sick and bed patients gathered to one side—leeward is better—and the convalescents and walkers grouped on the opposite side. By this arrangement the very ill will be less disturbed by noise and by the walking patients passing their tents when reporting for treatment and when going to their meals.

COOKING AND EATING.

It is an old story to say that the kitchen and dining tents should be located to windward, but in addition to this they should be placed at a great distance from the camp. The matter of convenience should not be considered. I do not think there ever have been many men in the Navy sent to the mast charged with being too lazy to eat, and it is a source of constant wonder to me to see what a stimulant "mess call" is to tired legs and jaded spirits. The cook tent should be at least 300 yards to windward of the camp in order surely to prevent flies from passing from the sick and the latrines to the food.

The real time to protect food by screening, etc., is after it is cooked. Many times when cooks and mess attendants apparently thoroughly understand and appreciate an order to protect food, their mental and physical efforts become sincerely focused on the food in its raw state. They will carry out all details to protect raw meat and will place it, when cooked, on tables or otherwise exposed places for a long period of time before it is consumed.

In all kitchens of a camp hospital a small screened cupboard should be set up and food placed therein until wanted in order to shorten as much as possible that period of exposure. This screened cupboard should be so made as to be readily cleaned with boiling water.

If possible efforts should be made to determine if any person engaged in the preparation or handling of the food is a typhoid carrier, and I believe it would be well to rule out from such work all persons having a typhoid history.

Eating in the patients' tents should be prohibited as far as possible. This will go a long way in preventing the presence of flies, ants, and roaches. When bed patients are fed the dishes and débris should be removed at once.

WATER.

There should not be much discussion about water. The words "distilled" or "sterilized" should about finish any argument. Uncertainty as to possible contamination should be sufficient to condemn any water. This is of unusual importance in our military life, because almost all the water-borne diseases demand so many sick days in each case of infection.

When a certain water is made official for use, no other should be allowed. The use of any other water for any purpose should be made impossible or extremely inconvenient. Directions and orders will not be of much use. This selected water should be used for all purposes—drinking, cooking, the washing and rinsing of dishes. The

rinsing in pure water is of particular importance, for if this is not carried out we will not be any more sanitary than the Chinese women in the Canton house boats, whom I have seen wash their dishes in boiling water and then carefully rinse them by dipping in the river of unparalleled filth.

The certified water should also be used for personal washing and bathing, for there certainly is some risk of contact infection when the hands and face are washed with polluted water. All bathing should invariably be by shower baths.

The portable tub is an abomination that has no place in a camp hospital. It is practically impossible to sterilize it, and after one has been used to bathe a typhoid patient who is sick enough to have a leaky rectum and bladder the tub is subsequently and for an indefinite period a source of potential danger. Shower bathing is economical of water, and this is a strong recommendation for its use in a camp hospital.

I mention, only in passing, that common drinking cups should not be used. In addition, the use of private water containers in tents should be prohibited, as they will promote promiscuous drinking and attract water-seeking insects.

GARBAGE.

I must confess that I have never been able to form a definite opinion as to the best disposition of camp-hospital garbage. To burn it takes an enormous amount of fuel. It also has the added difficulty of the separation of the wet portions from the dry and the disposition of each. On the other hand, if the garbage is buried after being fly blown the eggs will hatch, and the larvæ will crawl out through several feet of earth, if necessary, and complete their life cycle and appear as flies. Garbage is really not a source of any danger except as a fly breeder. Its decomposition is desirable, as in this way pathogenic germs are probably overcome. Fuel is scarce in most places, and I believe the best general rule for the temporary care of garbage is to bury it. There need be only one precaution, namely, to prevent prior deposition of fly eggs. The garbage should be covered with the smallest possible amount of earth in order to promote dessication and oxidation.

At various times during past years I have treated garbage as follows: It is received in tight cans and periodically sprinkled with a mixture of kerosene, formaldehyde, and soap. The best formula is as follows: Equal parts of kerosene and a 5 per cent solution of formaldehyde; to a gallon of the mixture an ounce of tincture of green soap is added. The slight solubility of the soap in kerosene makes a permanent emulsion possible, and when this mixture is used on gar-

bage and latrines flies will be few and far between. I believe it will absolutely prevent the laying of eggs.

This emulsion is very inexpensive, and as it is mixed throughout the garbage it allows of burning over before covering with earth. It is also a thorough deodorant and certainly should have some antiseptic properties. I think we can entirely disregard soil contaminations at the present time. We get nothing from the soil, and there is no personal contact. All surgical dressings and similar material that may carry active infection should be burned.

LATRINES.

The management of this necessary evil is our most serious proposition. The controlling idea must be convenience. Many a man will walk a mile to fill his stomach and not take a single step to relieve himself of the remains of the feast. We must locate the latrines near the living tents and make the most of a bad situation. Of course, they should be to leeward as much as possible, but I do not think this is an important point if the kitchen is at a considerable distance to windward.

There are a few practical points to be considered when constructing a temporary latrine. If it can not be perfectly inclosed or screened it should be absolutely open and exposed in every way.

A water-closet which is apparently but not really fly proof is dangerous. The pits should be as shallow as possible, in order that the contents can be exposed to the full effect of the sun without the sides casting shadows. In shallow pits the pressure of ground water need not be considered, and the tendency will be for seepage to flow from within outward. This will promote rapid drying. Capacity can be obtained by extending the pit, and this should always be in a line from east to west, so that the sun can shine as much as possible in the bottom of the excavation during the greater part of the day. Screens for privacy should be so arranged as not to cast shadows in the pit.

Long, narrow, and shallow latrines can be dug entirely with tools, and no personal contact need be made with the earth below the surface of the ground. About 1 foot should be the maximum depth. When the latrine is partially full, it can be covered and a new pit dug parallel to it. The latrine in use needs no special treatment other than fly chasing and deodorizing. This can best be done by frequent scattering of a little earth and the constant use of the kerosene-formaldehyde emulsion. I again recommend a trial of the latter, as I have found it far superior to any other preparation I have ever used.

Our camp hospitals ashore will probably be in the Tropics. The mosquito question will therefore be ever present and important. The breeding places have received tremendous consideration and all the approved preventive means should be carried out. But I think the insect has been somewhat neglected in his hours of ease and repose. During the day the mosquito uses any place that is dark and quiet for a refuge. A proper campaign must include daylight work. Wind and sunlight are fatal, and the insects should be driven out and subjected to these unfavorable conditions during the day. It is remarkable what little hiding spaces are needed. A small stone or lump of dirt is sufficient to harbor many. Grass that is 2 inches high and slightly matted will hold swarms.

When Fisherman's Point at Guantanamo was first occupied by the marines, the entire flat ground was filled with hundreds of crab holes. Mosquitoes were a pest that seemed to defy our best efforts at eradication. As an experiment a sample crab hole was investigated. A net was placed over it and the refugees smoked out. A count revealed more than a hundred insects. All the holes were then kept filled and the improvement was sudden and great. When we consider that 12 or more incubation days must elapse before a mosquito can infect one person from another, this question of hiding places becomes most important, especially in a camp hospital where there will be patients with acute malaria under treatment, with others who are free from any mosquito-borne disease.

It means that a mosquito must linger in the camp for almost two weeks after biting an infected person before she becomes dangerous.

Therefore, when a camp hospital is established in the Tropics it would seem good judgment to select a site free as possible from trees, brush, and grass. Shade can be secured by tent flies.

Lights should never be allowed in patients' tents, and the use of lights elsewhere in the camp should be limited as much as possible. All tents should be thoroughly brushed out during the day when the wind is blowing. Very few mosquitoes fly during the middle of the night. Early evenings and dawn are the danger periods. At these times the camp should be patrolled to see that all patients are properly under nets. Nets should always be tucked under the mattress. If a small end of the net is hanging down, the mosquito, under way, will strike it, turn up, enter, and proceed to feed.

In my camp experience I have always noticed a great opportunity presented to mosquitoes by men sleeping against the net. In the narrow bunk the sleeper will spread out and some part of his body will be touching the net. This, of course, makes easy and pleasant feeding for the mosquito. Many times I have seen as many as a dozen

perched on the great toe of a marine as he lay asleep with his foot against the net. I believe I can safely state that every person sleeping under a net in the tropics is exposed at least once during the night to mosquitoes. It can easily be seen what a risk is here created when a body of our men occupy a yellow fever country. It is a most important point in connection with fever prophylaxis. To be perfectly safe would require the services of a sentry for each sleeping man. One way to combat this fault is to have the lower half of the net made of sheeting or some closely woven material. The mosquito does not go in for test borings to any extent, consequently, if a leg or arm is pushed against the tight bottom of the net no biting will occur. Another method is to lace canvas screens about the bunk above the mattress. These need not be more than 8 inches high.

Sand flies cause more personal discomfort than mosquitoes. They pass through ordinary nets and are very active all night, especially during moonlight. They possibly carry infection. They can be kept out only by using a fine-mesh net.

The more I study the mosquito problem the more convinced I become that standing water is not necessary for their propagation. In the woods about this station mosquitoes are found in abundance after a drought of several months. There could not possibly be water present. It is necessary first to eliminate unexpected water containers, such as air plants, century plants, tree cavities, etc. The dews are very heavy and it is possible that this amount of water on leaves and underbrush allows of a precarious, but continuous, existence of the mosquito.

VERMIN.

Of this group bedbugs and fleas deserve special mention. As beds are occupied by various patients in succession in a hospital, there is an unusual opportunity for vermin to transfer infection. The investigations of the late Passed Asst. Surg. Riggs at Port Royal almost demonstrated the connection of the bedbug as the active agent in a small typhoid epidemic. The frequent finding of acid-fast bacilli in bugs that have bitten lepers certainly suggests a possibility of transmission of infection with the bug as host.

DEFENSIVE ELEMENTS OF THE BODY.

By W. W. Wilkinson, assistant surgeon, Medical Reserve Corps, United States Navy.

Possibly no subject is of more interest to the profession in all its branches than the vital processes by which the body combats disease, and it is thought that a presentation of the present status of thought in this respect may be of interest. What I shall say will doubtless be elementary to many, but it is my belief that, except to those who

are students or investigators in this line of work, the subject of immunity is a hazy one, a more or less confused mixture of side-chain theory, serums, vaccines, and serological nomenclature. I realize only too well that much of it is theoretical and speculative, and that any of its innumerable problems can easily lead us into interminable disquisition. I shall endeavor only to call attention to its salient points, avoiding as much as possible controversial ones.

One can hardly approach a subject which has engrossed the minds of such men as Pasteur, Metchnikoff, Ehrlich, Bordet, Pfeiffer, Wassermann, Flexner, and others, except in a spirit of admiration and humility. We are aware of attempts to deride the complexity of this subject, and there are some who would depreciate its value because its problems do not lend themselves to routine clinical application. The more one studies the subject, however, the more it is seen that complexity is unavoidable. Life itself is complex, and attempts to elucidate its phenomena necessarily can not be simple.

The modern conception of body defense may be said to have had its birth with the development of the science of bacteriology. Such facts as we know have been chiefly gained by experimental study either with bacteria themselves or the products of their biological activities.

Bacteria are always present in man's environment, and only to a limited degree is he able to destroy them or protect himself from them. The production of infection, therefore, depends upon other things than their mere presence. One of a family has scarlet fever; other members, though in close contact with it, remain immune. Diphtheria bacilli are found in the throats of individuals without symptoms of the disease, and other examples could be mentioned. Bacteria must, in order to gain a foothold, find a suitable soil. The phenomenon of infection is therefore a reaction between the invading organism and the body defenses. The subtile forces that go to make up man's equipment for these invisible conflicts collectively are known as resistance, and, when specifically marked, as immunity.

Before discussing the types of immunity and some of its manifestations, we may with profit consider the factors, first, that excite it, and second, the defensive reactions or antagonistic substances that the body develops.

Any substance which when introduced into the body is capable of producing a specific reaction product (or antibody) is known as an antigen. Bacteria, blood corpuscles, and certain somatic cells are antigens, because, following their injection, such specific antibodies are produced, and can be demonstrated *in vitro*. From the standpoint of disease we are more especially concerned with the bacterial antigens. To understand these we must revert to the biologic characteristics of the bacteria themselves. They may be divided into two

classes: First, those which secrete soluble toxins, such as diphtheria and tetanus; and second, those in which the toxins are bound up in the cell and do not appear except as disintegration or autolytic products. To this class is given the name of endotoxins. The majority of bacteria pathogenic for man belong to this group, such as the staphylococci, streptococci, pneumococci, meningococci, typhoid, etc.

Following the introduction of antigens into the body by fortuitous or artificial means, certain reaction products are developed in the individual directed against that specific substance, and to these is given the general name of antibodies. Some of these are protective, while others, as far as we know, exercise but slight influence. Many of them can be demonstrated, and undoubtedly many can not. They usually take their name from their action. For instance:

Injection of bacteria into an animal is followed by the development in the serum of that animal of a substance which is capable of clumping the bacteria employed. This is the phenomenon of agglutination, and these antibodies are known as agglutinins. If they exert any protecting influence in disease, it is not understood. Their demonstration in typhoid fever is a valuable diagnostic sign, and also, being specific, they serve in the differentiation of bacteria.

Again, when a foreign proteid (bacteria, blood serum, milk, egg albumen) is injected into an animal there is developed in the serum of the animal a substance capable of producing a precipitate with that proteid when mixed with it in a test tube. This substance is called a precipitin and is specific for the proteid in question. Like the agglutinins, these antibodies exercise no known protective function, but yet have an important bearing in differentiating animal proteids. This is the principle of what is known as the biologic test for blood. Thus, blood spots dissolved in salt solution, if human, will give a precipitate if to the solution is added serum from an animal immunized with human blood, and no precipitate if the blood stain is from any other source.

Another antibody is called antitoxin. If an animal is injected with a soluble bacterial toxin it develops in response an antibody which is capable of combining with and neutralizing that toxin, and such antibodies are called antitoxins. The antitoxins of diphtheria and tetanus are examples of this.

Another antibody, and one of great importance, is concerned in a lytic or dissolving action, but unlike the ones just mentioned it requires for its action the presence of another substance normally present in the serum. I refer to the amboceptor or immune body. The substance necessary for its action is known as complement, and I will later refer to it more in detail.

In 1894 Pfeiffer and Isaeff discovered that cholera spirilla, when injected into the peritoneal cavity of a guinea pig immunized to

that organism, were promptly disintegrated. It was later shown that this occurred *in vitro* as well and that it occurred from the action of two substances—an antibody in the immune serum and the normally present complement. This antibody is the amboceptor, and acting against bacteria is known as a bacteriolytic amboceptor. A few years later Bordet discovered that the phenomenon of hemolysis or disintegration of red cells occurred in the same way. Human blood injected into a rabbit develops in the rabbit's serum an antibody, or amboceptor for the human red-blood cell, so that when this serum is added to a suspension of human blood cells in salt solution it will, in the presence of complement, cause a lysis, disintegration, or solution of the red cells and set their hemoglobin free in the medium. Such an amboceptor is called a hemolytic amboceptor. Bordet's discovery is of great value, forming the keystone of the serum test for syphilis.

All antibodies possess a common property—that of specific affinity for their antigens—and in a general way may be distinguished according to their action. Division is conveniently made into three groups:

First. Antibodies which merely enter into combination. These are the antitoxins. As far as known they have no other effect than that of satisfying the combining affinity of the toxin.

Second. Antibodies which not only combine but produce some recognizable physical change. These are the agglutinins and precipitins.

Third. Antibodies which are concerned in some destructive action. They not only combine, but to produce effect require the cooperation of a third substance, the complement. To this class belong the bacteriolysins, hemolysins, and lysins against certain somatic cells.

While not an antibody in the sense of being a reaction product, there is an important substance in the blood serum which is actively concerned in the defensive mechanism, and this is the complement. In 1886 Nuttall and others showed that normal serum contained a substance capable of destroying certain pathogenic bacteria. Nuttall later discovered that this bactericidal power became diminished with time and could be prevented entirely by being exposed to a temperature of 56° C. for half an hour. Buchner, confirming his work, called this thermolabile substance "alexin." Pfeiffer, Metchnikoff, Bordet, and others then showed that to bring about the destruction of the bacteria the agency of an amboceptor was necessary; so that complement is best defined as a substance, thermolabile, normally present in the blood serum, and one of the two active agents, of which the amboceptor is the other, concerned in lysis. In effecting lysis of bacteria it is bactericidal. This substance is also Metchnikoff's "cytase," so named because he believed it a product of the leucocytes. Complement is not increased during the

process of immunization and is identical for species, though variations in potency are met with. Greater variations in potency are observed between different species. Complement is apparently common with reference to antigen—that is, the same complement will act in a bacteriolytic or hemolytic system.

Other important defensive substances are the opsonins, but these will be discussed more at length under the subject of phagocytosis.

The mechanism by which these antisubstances are produced furnishes an interesting chapter in the subject of immunity. It is usually considered in two parts—the cellular and the humoral. The relative importance of each has long been a bone of contention between the French and German schools of thought. It is not within the scope of this paper to present the controversial points; there are volumes on both sides. The opinion of those on the "side lines" seems to be that both are actively concerned, to a large extent act conjointly, and that the separation can not be an absolute one.

The chief inspiration for the cellular conception comes from France and has emanated from Metchnikoff and his pupils at the Pasteur Institute. Their work has brought to light many important facts concerning the participation of the cellular elements of the body in its defense. The phenomenon upon which their conception is based is known as phagocytosis. The cells capable of this function are the polymorphonuclear leucocytes and the endothelial cells lining the serous cavities and vessels.

With the invasion of the body by foreign material there is seen either an attraction or repulsion of the phagocytic cell with relation to it, and such attracting or repelling influence is known as positive or negative chemotaxis. Following positive chemotaxis, the cell ingests the organism, and then ensues a conflict between the two. If the cell conquers, the bacterium is observed to disintegrate. The phagocytic activity is therefore directed against the vital activity of the invading organism, there being no satisfactory proof that the cells neutralize bacterial toxins.

The intracellular destruction of bacteria leads us to assume the presence of ferment-like substances within the cells with digestive properties. It is therefore, with some reason, assumed that the bactericidal substances in the serum are products of the phagocytic cells. Upon this assumption Metchnikoff believes that complement is a product of the leucocytes, calling it "cytase," as referred to before.

The substances that stimulate the leucocytes to phagocytosis were then investigated. Metchnikoff early attributed this action to the immune serum, but claimed that it acted upon the leucocytes directly. It was later shown that this was not true and that phago-

cytosis was aided rather by the action of some substance in the serum upon the bacteria, being bound to the bacterial cell and in some way lessening its powers of offense. This fact was confirmed and elaborated by Wright, who to these substances gave the name of opsonins. Their exact status is still under discussion, whether they are distinct bodies or some phase of the complement. Wright showed, and his work has been fully confirmed, that this opsonic substance could be increased in certain cases by the injection of the specific dead bacteria or their products, and as a result of this developed vaccine therapy. We are all familiar with the burst of therapeutic zeal following Wright's discovery, of the pilgrimages to Mecca, and the present "innocuous desuetude" of the opsonic index as a clinical procedure. However, though many of Wright's original claims have not stood practical application, we must not overlook his valuable contribution to the subject of immunity in his discovery of the opsonins and the undoubted value of vaccine therapy. There are some conditions, such as furunculosis, pustular acne, gonorrheal arthritis, chronic infections of the genito-urinary tract, and puerperal infections, in which vaccines yield results beyond any other form of treatment.

The humoral conception emanates from the German school, with which the name of Ehrlich is most prominently identified. It is based chiefly upon the assumption that the defensive process is a chemical one. Ehrlich in 1885 advanced the theory that cell nutrition was carried on by direct chemical combination between the cell protoplasm and the nutritive substances. He ascribed to the cell molecule a central atom group analogous to the benzol ring, with side chains for combination by chemical processes. Later, in his work on the reaction between toxin and antitoxin, he applied this same theory to explain the excess production of antitoxin radicles and the nature of the neutralization. The side chains of the cell molecule he called receptors. Under Weigert's law, regenerative processes of the body usually tend to overcompensation, and therefore continuous and increasing dosage of the toxin results in overproduction of antitoxin radicles or receptors, which circulating in the blood combine with the toxin before it reaches and damages the cell. Upon this basic idea he has developed an elaborate structure as an explanation of the various processes of immunity, which we know as the side-chain theory.

As one studies the controversial points between the two theories of immunity there does not seem to be such a great difference. Take the phenomenon of lysis, for instance. Here the argument is as to the action of the amboceptor; both agree on the result. Ehrlich believes that the amboceptor acts by possessing two combining groups and serves as an intermediary body to link the complement to the antigen. Bordet disputes the linking action of the amboceptor, be-

lieving that each acts directly on the antigen, the amboceptor sensitizing the antigen to the action of the complement. It seems to be a case of hairsplitting. The essential fact is that the particular destructive effect is brought about by the action of the two substances, the specially developed amboceptor and the normally present complement.

Immunity is of two kinds: natural and acquired.

Natural immunity is a mystery both of race and species, a natural heritage to resist a particular infection. We are familiar with examples of this, such as the insusceptibility of animals to many of the infections to which man is vulnerable. The cause of this species of immunity is little understood, but from such data as we have it is thought to be due to differences in diet, metabolism, and temperature which are inimical to cultural adaptation of the organisms.

Racial immunity is exemplified in, for instance, the insusceptibility of the Jewish race to tuberculosis, the negro to yellow fever and malaria. When it comes to the cause of this type there is a growing belief that it is due to hereditary acquirement. The immunity of the negro to yellow fever and malaria finds a plausible cause in that the diseases have been endemic in the localities in which he lives for long periods. In support of this is the susceptibility of races to recently introduced diseases, as for instance the high mortality of the North American Indian from tuberculosis and the inhabitants of the Pacific Islands to measles.

The knowledge that recovery from an infectious disease leaves a more or less marked immunity to future attacks has long existed. Resistance acquired in this way is known as acquired immunity. It may also be produced artificially. The practice of inoculation for smallpox and Jenner's discovery of vaccination were the first instances of the production of immunity by artificial methods. It is to Pasteur that we owe the application of exact laboratory methods in the production of immunity, which was developed in his experiments with chicken cholera.

Acquired immunity, artifically produced, is of two kinds: active and passive.

By active immunity we mean the immunity gained by the injection of killed, attenuated, or sublethal doses of bacteria or their products. By this the powers of resistance are gradually increased by physiologic processes. This type of immunity is exemplified in vaccine therapy. Acting as an antigen the dead organisms stimulate the production of antibodies, and may be directed either in a curative or prophylactic way. The brilliant results achieved by Pasteur in the treatment of rabies, the prophylactic vaccination with typhoid bacilli, and the curative results in many chronic infections, attest its value.

Passive immunity, as its name implies, is purely a passive process, the defensive mechanism of the individual taking but little, if any, part in its production. It consists in the transference to an individual of sera rich in specific antibodies from actively immunized animals. It is applicable chiefly against diseases caused by bacteria which secrete powerful toxins, such as diphtheria and tetanus.

Attempts to immunize animals with the endotoxic bacteria rather tend to produce substances of a destructive character to the specific organism, and hence such sera acquire bactericidal properties. While more or less successful in animal experimentation the, therapeutic value of such sera in man has been small. The most notable success is Flexner's antimeningitis serum. In order to effect curative results, apparently antisera of this type must be injected into closed cavities. As is well known, in the case of the antimeningitis serum it has to be injected into the subdural space, the seat of the infectious process, to cure. In some observations made by the writer in 1908–9 in a series of cases of epidemic meningitis treated with the antimeningitis serum by Dr. Morgan and himself, the destructive action of the serum upon the meningococcus was striking from studies of the spinal fluid withdrawn after the serum injections. This was manifested by increased phagocytosis, loss of staining power, and failure of the organism to grow in culture.

There have been a number of these antibacterial serums developed experimentally, and several are now on the market, such as the anti-streptococcus and antigonococcus sera. In the light of our present knowledge it is questionable if these sera do not at times do more harm than good. The endotoxic class of bacteria, as far as known, does not produce antitoxins and the body defense consists in a destructive or lytic process. We know that in order to bring this about three substances are necessary—the bacterial antigen, the amboceptor, and the complement. The defensive substance we expect from antibacterial sera is an excess supply of amboceptors. Assuming that the infected individual is deficient in amboceptors, the injection of a large quantity of artificially produced amboceptors (represented in the antiserum) may serve at once to fix complement to the bacteria and bring about lysis of a large number of them at once. Remembering that this class of bacteria does not become toxic until destroyed, the system may be suddenly flooded with a large amount of toxic material with serious damage to the tissues. Reasoning thus, it would seem that small quantities of such sera would be more safely administered.

Antibacterial sera are therefore a phase of passive immunity.

There seems to exist in the minds of some a confusion as to the difference between a vaccine and an antiserum. Wishing to make this clear, it may be stated that a vaccine consists of killed bacteria

or their products, is injected into an individual, acts as an antigen, and calls forth the production of defensive substances on the part of the body cells, chiefly those substances which stimulate phagocytosis. It is a type of active immunization. An antiserum consists of the serum of an animal artificially immunized to some particular organism, and containing an excess of antibodies against the particular organism which have been developed by the animal's defensive mechanism. Injection of this antiserum into an individual is a transference of these antibodies to him, and is therefore a type of passive immunity. The vaccine is an antigen; the antiserum is not.

An explanation of the failure of both vaccines and antisera to effect a cure in many cases may lie in the following: As observed by Grassberger, Shattenfroth, and Bordet, bacteria developed on culture media which differ too much from the body fluids are not suitable, perhaps, to be employed in immunizing animals for the production of therapeutic sera or in the preparation of vaccines, as it is possible that in many cases bacteria grown on artificial culture media fail to form the antigens which they produce in the human body during infection. Again, the adaptive changes which bacteria undergo in the body probably have an influence. It is conceivable that organisms that remain in the tissues for long periods of time acquire a counter-resistance through selection and cultural adaptation, so that antibodies produced in animals by bacteria grown on artificial media find different conditions with which to cope when opposed to the organism in the human body.

The production of demonstrable antisubstances by no means explains the whole of the phenomena of immunity. It is well known that acquired immunity may exist without the presence of demonstrable antisubstances in the serum. In the case of typhoid fever, for example, patients exhibit a marked immunity long after the agglutinins have disappeared from the blood. This immunity is perpetuated, no doubt, by antisubstances, but as yet they do not lend themselves to demonstration. This fact lends support to the belief that the agglutinins in this disease are not the real defensive factors, though subject to specific demonstration and a valuable aid to diagnosis. The immunity conferred by an actual attack of typhoid fever is apparently more potent and lasting than that of prophylactic inoculation, and yet the demonstrable antibodies (the agglutinins) after the inoculations are in far greater amount than during or after an attack of the disease itself.

It is a familiar observation that as we grow older we become less susceptible to infectious diseases and exhibit an immunity without obvious cause. This is possibly due to a gradual immunization from the presence of bacteria which are parasitic but without sufficient

virulence to produce the disease. Intrauterine infection is well recognized, having been observed in a number of diseases—syphilis, scarlet fever, smallpox, etc. It is not unreasonable to suppose, therefore, that intrauterine immunization takes place as well. The insusceptibility of many children to the various infections might lie in this hypothesis. Or, of course, we can speculate that protective substances are transmitted in the complex of heredity.

As we review the large list of diseases from which patients recover, the inadequacy of pharmacology offers a sorry commentary to the advances made in other lines. The fault may, to some extent, be laid at the door of the profession itself and is due to the dominant sway of pathological anatomy and diagnosis. For many years the ability of men to diagnose a case, predict the anatomical findings, and confirm them by post-mortem examination seemed to represent the sum total of professional attainment, and prevails yet to some extent. As pointed out by Moltzer, "this attitude has been a deterrent to progress, because the identification of pathologic changes after death with the preceding disease is a misleading and dangerous conception. The pathologic state after death is only a consequence of the disease and not the disease itself; disease is not a state but a process, a functional disturbance which may lead to permanent anatomic changes if not intercepted in time. Too great emphasis can not be made upon this point, because functional disturbances are more amenable to correction than permanent anatomic changes." It is the beginning recognition of this fact that has given such an impetus to biologic chemistry, physiology and the problems of body defense as now witnessed.

If we take an inventory of our pharmacologic possessions, we find that we have specifics for malaria and syphilis, and in Ehrlich's recently discovered salvarsan one for diseases caused by spirilla. After these are left we have three groups of therapeutic procedures:

First. Drugs or measures to control or relieve symptoms.

Second. Physiologic measures to increase the resistance of patients.

Third. Reaction products of infected animals.

All three are directed to one end—to increase or favor natural processes. The production of defensive substances, like all physiological processes, requires for its most rapid and efficient attainment a healthy condition of the tissues, and the meaning of "good resistance" is apparent.

In the case of every tissue and organ in the body there is seen a power of working beyond the normal demands, and this power is clearly of a protective or defensive nature. The phrase *vis medicatrix naturae* indicates that this view of the body functions has long been recognized in the case of disease, but it is only in recent

years that we have come to see to how great an extent the so-called processes of disease are exemplifications of this defensive mechanism.

The subject possesses magnitude in concept and possibility. There is much we do not know, but out of the mass of theory and experimental data there remain certain facts which, whether they lead us to the goal of finality or not, yet serve as the most logical basis for the interpretation of disease and the means by which man's struggle for existence is maintained.

ADVANTAGES OF PARIS FROM A MEDICAL POSTGRADUATE POINT OF VIEW.

By R. A. BACHMANN, surgeon, United States Navy.

The number of Americans studying medicine in Paris in 1910 was given by the minister of public instruction as 123. In the fall of 1912 I made a pretty thorough search through the better known hospitals and clinics and failed to find any other American postgraduate student besides myself. It may be that the minister's figures included undergraduates, of which quite a number exist.

Why Paris is so neglected by Americans is hard to understand unless it is that the more widespread knowledge of the German language in our country leads to the selection of Vienna and Berlin.

The subjects in which Paris seems to have exceptional opportunities are, in order of the advantages offered, dermatology, urology, bacteriology, radiotherapy, and general surgery.

For the study of skin diseases the St. Louis Hospital is without equal. Founded during the reign of Henry IV as a pesthouse, it became in the eighteenth century a refuge for those afflicted with itch, ringworm, and cutaneous ulcers. In the beginning of the nineteenth century it finally became a recognized hospital and college for dermatology and syphilis.

The head of the staff is Prof. Ernest Gaucher, and the list of the other clinicians includes such well-known names as Sabouraud, Brocq, Morestin, and Belzer.

The out-patient department treats from 100 to 250 patients every morning, including Sunday. Attendance is free. Lectures on various subjects take place daily at 10 a. m. and 2 p. m. Not the least important part of the hospital is the wonderful collection of models made by Baretta and placed in a museum specially built for that purpose. At present these models number 3,000, and nearly every known skin disease is represented in a manner so minutely exact that the most detailed lesion is faithfully imitated. Attendance is free.

Special courses in any class of diseases or therapeutics at the St. Louis Hospital can be arranged for with the various "chefs de clinique."

Foremost in the study of bacteriology is the Pasteur Institute. Metchnikoff is at its head, ably assisted by Roux, Sabouraud, Laveran, Dujardin-Beaumetz, Levaditi, and others as well known. A general laboratory course is given, beginning the middle of November and lasting 100 days. The cost is 100 francs and laboratory expenses.

The two hospitals where genito-urinary studies are best pursued are the Necker and the Laribosier. Necker affords the best clinical and laboratory material. The head of the department is Prof. Legeau, pupil of the famous Guyon and author of an excellent work on genito-urinary surgery. His assistants are Papin and Marsan. The former gives a private course in cystoscopy and the latter in urethroscopy. Both are practical, and an abundance of material is furnished. Papin's course consists of 20 lessons and costs 250 francs; Marsan's of 10 and costs 100 francs.

In this hospital one can see a great deal of surgery, cystoscopy, and urethroscopy every morning. There is always something going on, including a large out-patient department.

At Laribosier Prof. Marion gives each year, beginning on the 5th of November, a complete course in urology, including practical demonstrations of cystoscopy, endoscopy, and endo-vesical operations.

Other hospitals giving excellent facilities for the practical study of urology are Hospital d'Urologie et de Chirurgie Urinaire, Avenue de Suffren, and the Hospital International, Boulevard Arago.

In addition it would pay one well to visit Prof. Luys in his private operating room, 20 Rue Grenelle. His demonstrations of his own cystoscope and urethroscope are most interesting and instructive. His work on gonorrhea and the various brochures on the instruments bearing his name are standard.

In radiology and radiotherapy one can get an excellent course from Prof. Béclère at the Hospital Saint-Antoine. The course is very complete, including radioscopy, radiotherapy, radiography, radium, and radium therapy. The cost is 100 francs.

At the Hospital Boucicaut and Hospital Trousseau there is a great deal of radio work done daily. At the Hospital de la Pitié they average 300 radiographs per month. This laboratory is well installed and is an annex to Babinsky's service in the same hospital.

There is a great deal of interesting surgery done in Paris, and to go into a detailed description of it would extend this paper to undue length. I shall merely give a list of the more prominent surgeons, their special work, and at what hospitals they can be seen:

Prof. Thiery, Hospital de la Nouvelle-Pitié, general surgery daily at 9.30 a. m.

Prof. Lejars, Hospital Saint-Antoine, general surgery Mondays at 9 a. m.

Prof. Tuffier, Hospital Beaujon, general surgery Tuesday, Thursday, and Saturday at 9 a. m.

Prof. Hartman, Hospital Bichat, surgery of stomach, liver, pancreas, and spleen Monday, Wednesday, and Friday at 10 a. m.

Prof. Morestin, Hospital Tenon, general surgery.

Prof. Gosset, private hospital, Rue Antoine-Chantin, every Friday at 2 p. m., general surgery.

This list must be, of course, incomplete, and there are many more surgeons who operate in the numerous hospitals of Paris. There are also the surgeons who have their specialties like Pozzi (gynecology), who operates at Hospital Broca and Ombrédanne, who specializes in surgery of infants at the Hospital Bretonneau.

The hospitals themselves are likely to prove disappointing to an American. Among the newer hospitals the Nouvelle Pitié, 880 beds, and the Hospital des Enfants-assiste, 226 beds, are the best.

It will perhaps be better understood why the French hospitals are so inferior to our own when we remember that in Paris a hospital is almost a charity house—the better middle and upper class people rarely going there, receiving their medical and surgical attention at home or at some maison de sante—small private hospitals more in the nature of our sanatoria.

The semiprivate hospitals, like the English, American, and Russian, are of the best type, though small. Gosset's hospital is entirely modern and well equipped.

One can not help but notice that even in the oldest hospitals one always finds an excellent bacteriological and pathological laboratory, a complete radio plant, hydro and electro therapeutic rooms, the various light treatments, and a photographic department. There seems always to be an artist among the internes also, who illustrates cases in the most beautiful and accurate way.

Anyone expecting to find in Paris wonderful things not to be seen in any large medical center at home will be very much disappointed. The French have been greatly influenced by our surgical methods. Prof. Pozzi, pointing with pride to his gown, instrument table nurses, and assistants, remarked to me in his clinique: "You see, all this I copied from the Mayo brothers." He referred to the complete gowns, thin rubber gloves, nurses' headdress, and general arrangement of operating-room furniture; and Prof. Metchnikoff remarked during a conversation: "Yes, I am quite accustomed to have the Americans do everything better."

The French surgeon works rapidly, does not gown himself completely, but trusts to a sterile apron and sleevelets, rarely has more than two assistants, wears the thickest kind of electrician's rubber gloves, and never allows a nurse to do anything except bring the cans of sterile materials into the dressing room and deposit them about the tables.

I was much struck with the way the Reverdin needle is used by everybody, and its advantages can not be denied. It is rare to see

a needle holder in use even for the deepest and finest sewing. Their operating tables are built without legs, resting on a thick column, which is lowered or raised at will by foot pressure. All the positions are instantly and securely obtained, the anesthetist making the changes from his seat without assistance. I was much impressed by its superiority.

The preparation of the patient and after treatment were the same as here, excepting, perhaps, that nearly all the medication is given under the skin. The Murphy drip is used everywhere.

The American Hospital is a small hospital of about 50 beds, built at Neuilly, just outside of the walls of Paris. It is like a porcelain house from roof to cellar, and one of the most beautiful little hospitals I have ever seen. It is exceedingly well managed, has an efficient corps of American nurses, and exercises the greatest charity to all Americans sick and in need in Paris. It also has the best of private rooms and all the equipment the large French hospitals have. Its surgeon is Dr. De Boucher, to whose skill and ability I can testify, and the medical staff consists of Drs. Magnin, Gros, and Whitman, whose reputation is widespread and well deserved.

In conclusion, I should like to advise all visiting medical men to visit Gosset and Pozzi. The former has a thoroughly modern hospital, mentioned above, and represents to my mind the best of modern brilliant French surgery. His technique is marvellous, and he combines with it rare speed and judgment. His abdominal retractor is well known in this country, the Mayo brothers adopting it after having seen him operate.

Pozzi represents the more conservative element. The Hospital Braca, where he works, is unique in having for mural decorations the work of some of the most famous of modern French painters, personal friends of the doctor, who have honored him in this way. Pozzi is an ardent admirer of American surgery, and has the personal acquaintance of nearly all our greatest men.

ESTIMATION OF TOTAL NITROGEN.

By E. R. Noyes, chief pharmacist, United States Navy.

Several methods have been devised recently for the rapid estimation of total nitrogen, especially that of urine. For the use of any but well-trained laboratory men most of these processes are open to serious objection. To overcome such features, in part at least, the following method was devised:

In a test tube (15 by 150 mm.) place 1 c. c. of urine and 1 c. c. of strong sulphuric acid and boil until frothing ceases, being careful not to allow any of the froth to leave the tube. Cool and add 0.5 gram

potassium sulphate and again boil until solution becomes nearly or quite colorless. Cool and then make up contents of tube to 5 c. c. with water. Again allow to cool and then fill the small arm of a Hinds-Doremus ureometer with it, the large arm of the instrument being filled with sodium hypobromite solution. The usual manipulations for a urea estimation are now carried out, allowing, however, 2 c. c. of the acid solution to run into the hypobromite. The number of divisions occupied by the evolved gas is observed and then multiplied by 0.373 the result being the number of c. c. of N. Correct this volume for temperature and pressure and multiply the result by 0.00125, the final result being the weight in grams of total N in 0.4 c. c. of urine.

Although the above was devised for urine it is obvious that it can be applied to many other substances. While absolute accuracy is not claimed, excellent results can be obtained if care is exercised. The time required should not exceed 30 minutes.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to pathological collection, United States Naval Medical School, April–July, 1913.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
989	Heart	Endarteritis, coronary arteries.	Naval Hospital, Newport, R. I.
1003	Pneumonic plague tissues		Dr. C. S. Butler, Cañacao, P. I.
1004	Bacillary dysentery		Do.
1005	Liver, sections of	Amebic abscess	Do.
1006	Amebic colitis		Do.
1007	Bubonic plague tissues		Do.
1008	Blood smears	Malarial	Do.
1009	Appendix	Schistosomum japonicum	Do.
1014	Smears	Samoan conjunctivitis	Dr. E. U. Reed, Tutuila, Samoa.

Additions to helminthological collection, United States Naval Medical School, April–July, 1913.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
19876	Beef	Filaria gibsoni	Dr. C. S. Butler, Cañacao, P. I.
19877	Appendix	Schistosomum japonicum	Do.
19878	Rabbit	Tenia serrata (cysticercus pisiformis).	Dr. G. F. Cottle, Great Lakes, Ill.

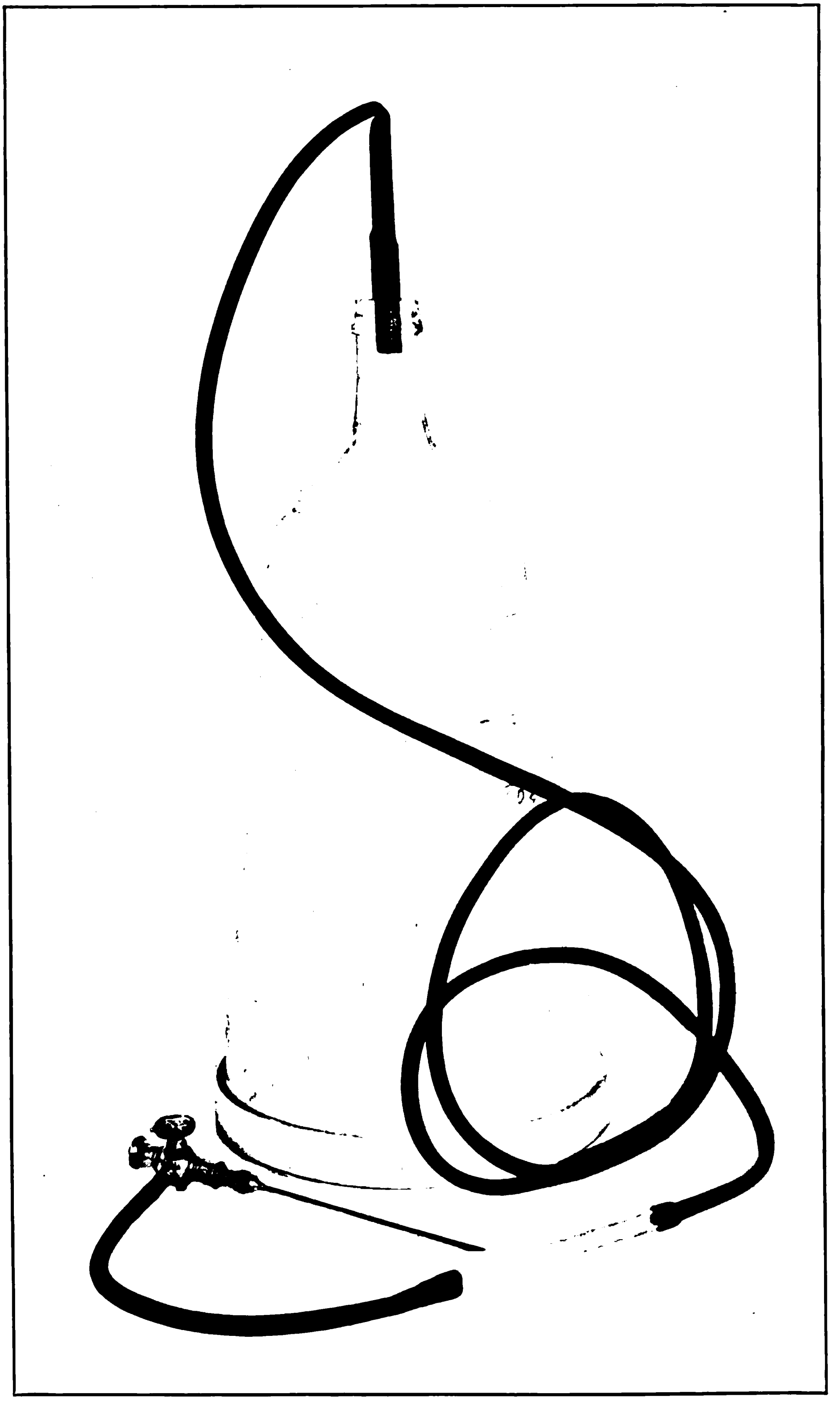


FIGURE I.—APPARATUS FOR INJECTION OF SALVARSAN.

SUGGESTED DEVICES.

THE USE OF A THREE-WAY COCK IN THE INTRAVENOUS ADMINISTRATION OF SALVARSAN.

By R. E. Stoops, passed assistant surgeon, United States Navy.

In the apparatus described below the departure from other intravenous outfits is in the use of the three-way cock and needle which is a part of the equipment of the small aspirating case issued to the Navy.

The usual gravity apparatus is used, consisting, from container to needle, of the following: A graduated percolator of 300 c. c. or more capacity, 4 feet small rubber tubing, 4 inches glass tubing, 8 inches rubber tubing, and a three-way cock with needle attached. The distal end of the short rubber tube is attached to the outlet on the side of the three-way cock. The three-way cock and needle may be considered as one piece, as the needle is not detached at any time during the operation. Accompanying is a photograph of the apparatus in use at the Naval Hospital, Great Lakes, Ill.

Technic.—After sterilizing the apparatus a small quantity of saline solution is poured into the percolator and allowed to run through the tube and needle until the solution reaches the bottom of the percolator, thus flushing the tube and needle and filling the tube with salt solution. In shutting off the flow the valve is set as in figure 1 of the diagram, showing a straight lumen through the needle and cock. The salvarsan is then poured into the percolator.

The vein is punctured subcutaneously, the blood flowing from the open end of the three-way cock. At this time blood may be obtained for Wassermann reaction (fig. 1). The cock is then turned so as to allow the salt solution, followed by the salvarsan, to flow into the vein (fig. 2). If an air bubble or other foreign body is observed in the glass tube, the cock is turned for a moment so as to throw the same out of the open end of the instrument (fig. 3).

When sufficient salvarsan has been injected, the cock is turned to the first position, shutting off the fluid in the tube and allowing the blood to flow out through the needle. The needle is then withdrawn and can leave nothing but blood in its wake.

If the entire quantity of salvarsan is to be administered, salt solution is poured into the percolator as the last of the salvarsan is about to leave it.

ADVANTAGES.

1. The three-way cock and attached needle, which is the valuable part of the apparatus, is already in every hospital and sick bay, and it requires but a few minutes to assemble the apparatus.
2. It is entirely a closed system at all times from percolator to vein.
3. Foreign bodies can easily be thrown out of the stream.
4. The three-way cock makes an excellent handle for the manipulation of the needle.
5. There being only one valve, the apparatus can readily be managed by one person.
6. The salvarsan is preceded by salt solution and, if desired, can be followed by the same.

I am indebted to Mr. A. W. Dubbs for the accompanying diagram.

A SUGGESTED IMPROVEMENT OF THE PRESENT FORM OF THE SANITARY SCUTTLE BUTT.

By W. E. EATON, assistant surgeon, United States Navy.

Although the present form of sanitary scuttle butt has served its purpose admirably, certain faults in its make-up become apparent on a little study. These no doubt act as a source of exposure and infection in the production of outbreaks of contagious diseases such as colds and especially tonsillitis.

The disadvantages of the present type have been found to be the following:

The apparatus is larger than need be, both as to spout and overflow attachments.

There are several extensive surfaces, creases, crevasses, and seams harboring dirt and other infectious material, exposed to the air, collecting dust and requiring frequent cleaning. These irregularities of surface are hard to get clean, and the cleaning process is as a rule infrequent and very incomplete.

With the present type of spout there is a funnel which needs to be filled with water before the men can drink. The pressure upward of the outflow is thus impeded by about 1½ inches of water (blanket effect), and the man must suck the water out of the funnel, as there is not sufficient ascent of the cone of fluid.

After drinking there is left standing in the funnel, level with its edge, water, which if not already soiled by the last drinker soon becomes contaminated by a film of dust and dirt. Small holes must therefore be made in the lower neck of the funnel to drain and empty it. These holes soon become plugged, and as the water flows out of the holes in the bottom there is a scum of dirt, oil, saliva, etc., depos-

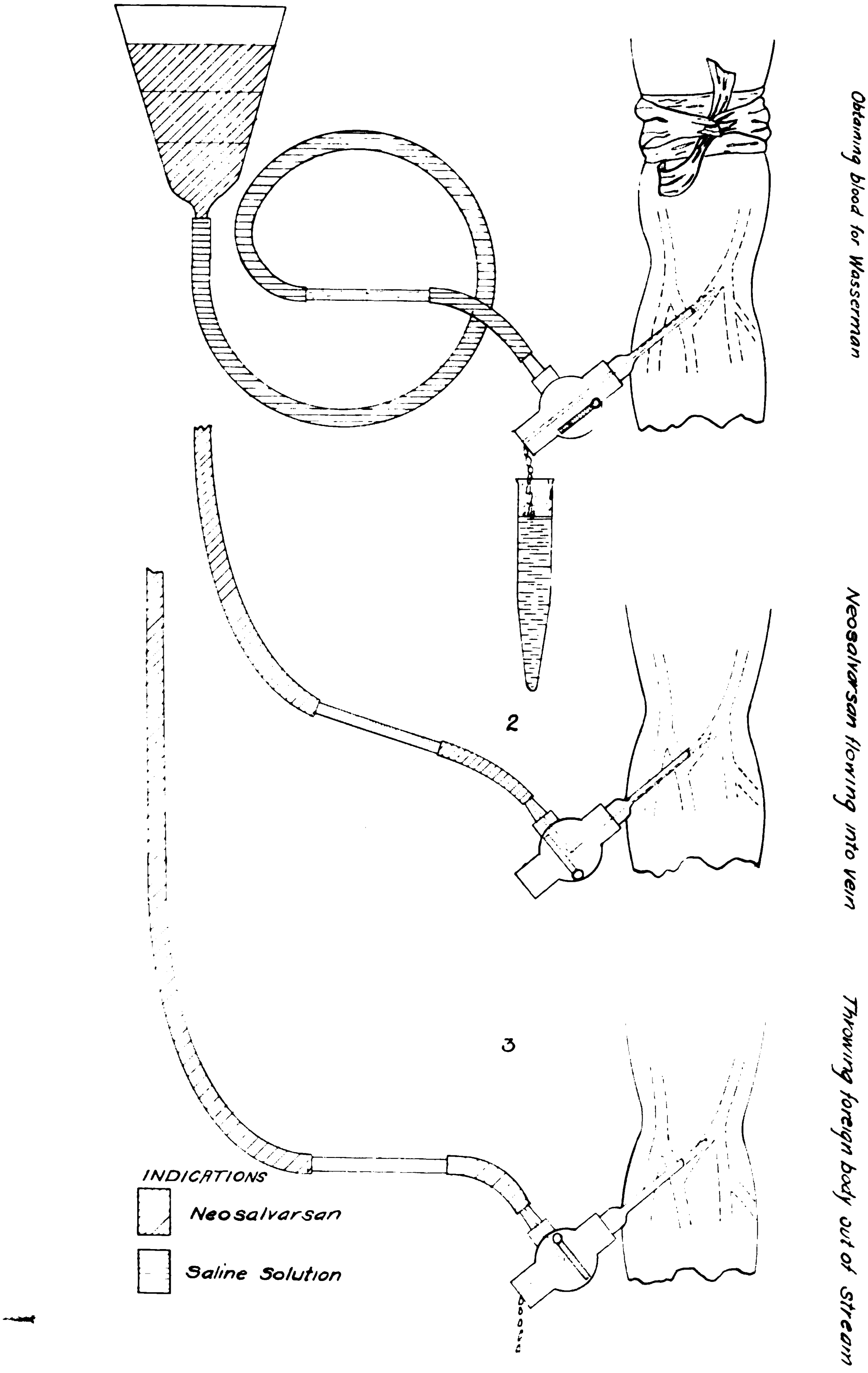
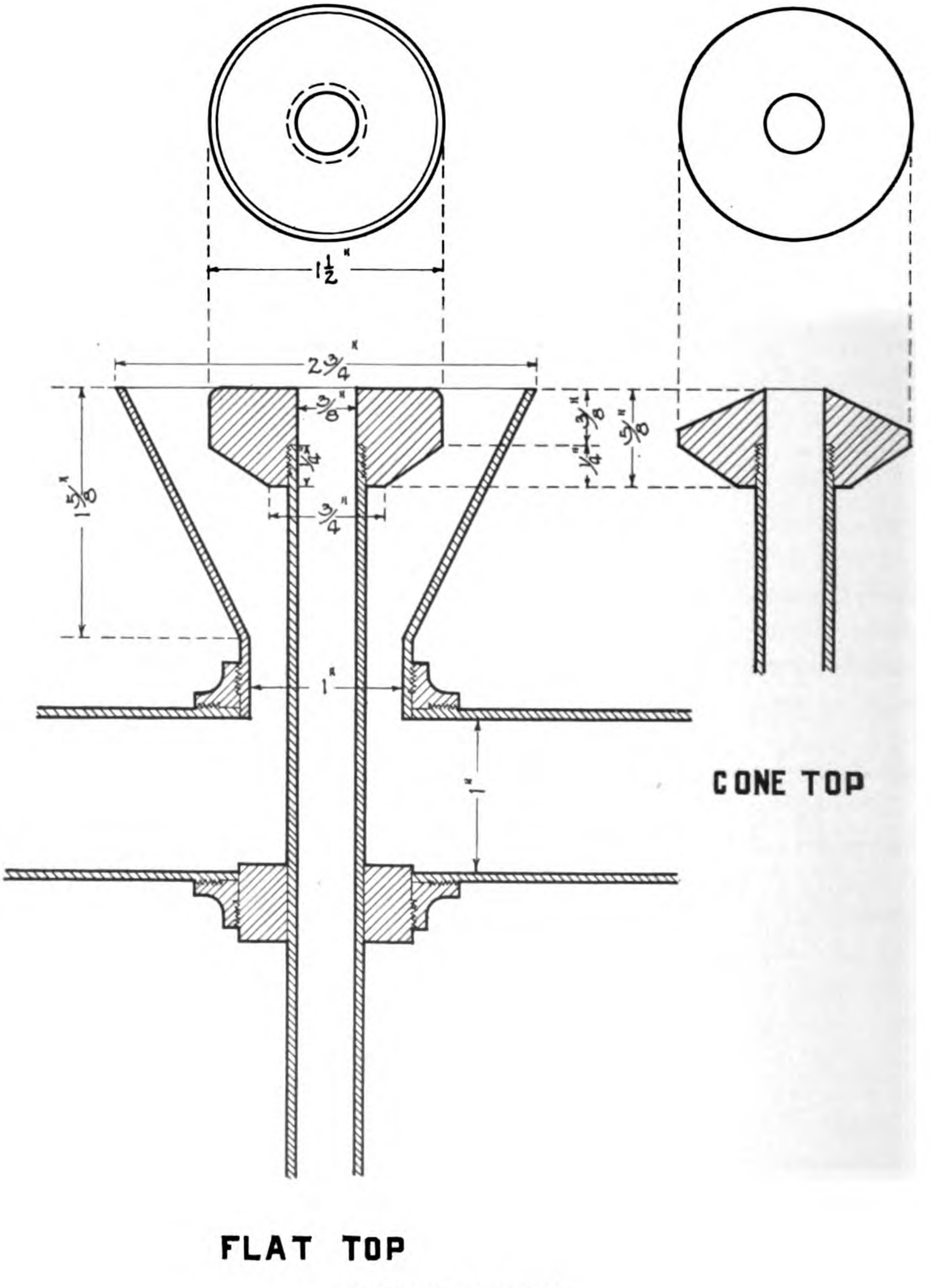


FIGURE 11.--METHOD OF USING THREE-WAY COCK.



DRINKING TERMINAL.

ited upon the sides, gravitating to the bottom. A portion of this scum rises on the surface of the water to the mouth of the next drinker, while still more clings to the sides. This matter is adhesive, so that when the funnel is empty what dust falls upon the surfaces remains there. If one will rub the finger over the inner surface he will demonstrate this fact to himself.

It is reasonable to suppose that given an outbreak of tonsillitis, diphtheria, or measles, infection can thus be carried to whoever drinks after infected cases.

I have recently seen a drinking funnel which has fenestrated sides, thus allowing the water to escape. There are disadvantages here also in that the same sizes of drinking and overflow funnels are retained. In order to drink, the man must thrust his lips into the funnel to the water, while his nose and chin come in contact with the edges, and contamination occurs from the nasal as well as the mouth secretions.

These disadvantages have appealed to me for some time, and other officers have suggested that some improvement could be made.

Upon investigation it seemed evident to me that if water could be discharged upon a smooth, plane, level, or cone-shaped surface at the same pressure, and by using the same scuttle butt as at present, a more satisfactory, sanitary, inviting, and cleanly terminal could be applied in place of the small inner funnel. I therefore had several tips made by the machinist and tried. The results more than fulfilled expectations.

The accompanying drawings are more explanatory than words. The present funnel was replaced by a smaller, nickel-plated brass tip, and the outflow pipe made longer, so that the T-shaped top came above the level of the overflow receptacle. With the same pressure of water a bubbling stream from 1½ to 2 inches high was obtained, drinking from which was a delight. This was installed on one of the scuttle butts on board the U. S. S. *Utah*, and it was soon found that the men used this in preference to the other, even waiting in turn to do so. All were much pleased with it and expressed the opinion that they preferred it to the others.

The tip requires less material and less time to make, requires little or no cleaning, there being no seams or extensive exposed surfaces—in fact it cleans itself. The outer funnel to catch the overflow need be only about one-half the size of the present one—another saving in material. A much smaller, neater, and more inviting apparatus is obtained. No changes need be made in the fitting of the present scuttle butt upon the substitution of this new tip, but newly constructed ones may be made much more neatly.

SUMMARY OF ADVANTAGES.

It is simpler in construction, requires less work and material to make, and can be easily made on board ship.

It does not require taking apart to clean and can be permanently fixed in place.

There is no contamination of water and no standing water.

It is cleaner, easier to clean, prevents infection, and is therefore more sanitary and inviting.

There is some economy in water.

It is preferred by the men to the old form.

It is similar to the latest designs for public bubbling drinking fountains as accepted by boards of health.

DESCRIPTION.

The terminal is a piece of nickel-plated brass, 1½ inches in diameter, five-eighths inch thick with a one-fourth inch bevel at the base, which is three-fourths inch in diameter. An opening three-eighths inch in diameter, which is countersunk at the base of the terminal for one-fourth inch to receive the supply pipe, is bored in the center. The supply pipe is led in through the drainage pipe, as in the present form. The terminal is inclosed by a small funnel 2¾ inches in diameter at the mouth and 1 inch in diameter at its base, where it is threaded and joins the discharge pipe, and is 1⅝ inches deep. This is large enough to carry away more than the overflow. All sharp edges are rounded over.

A cone-shaped terminal of the same size is shown, but is less desirable than the flat top.

CLINICAL NOTES.

REPORT OF A CASE SHOWING MIRROR WRITING AND ASSOCIATED MOVEMENTS WITHOUT PALSY.

By G. B. Crow, passed assistant surgeon, United States Navy.

C. A. W., sea., aged 26 years, was born of American parents in Ohio. His family history is good except that one cousin on his mother's side is an imbecile. His mother states that when he was born, or at any rate soon after birth, his hands seemed to be useless, seemed to her, as she remembers the condition, to be palsied. The labor itself was "natural" and he showed no other trouble save that of his hands. When he grew a few months older she noticed that any movement in either hand was accompanied by movement of the other. As a boy he could use both hands simultaneously for certain different uses with little or no difficulty, e. g., he could use a knife and fork, but he could not climb trees nor do any other things that were done by his playfellows. While he was a small boy his parents sought the advice of physicians who prescribed various exercises, among others that of playing the violin; there was some improvement up to the age of 15. He attended school between the ages of 6 and 15 years. He states that during the first three years in school he made little progress, but after that he did as well as other boys of his age. After he left school he tried to learn a trade but could not do so because each hand did whatever he was doing with the other. He could do farm work, such as plowing, driving a horse, or other occupations in which the whole arm was used, but could not do any work requiring the simultaneous use of the muscles of both hands in different ways. He enlisted in the Navy as apprentice seaman, January 28, 1911. Since then his service has been about equally divided between the U. S. S. *Franklin* and the U. S. S. *Minnesota*. He states that he had some difficulty in drills requiring the use of his hands while at the training station at Norfolk, but managed to get along fairly well until he was transferred to the *Minnesota*, where his duties were such as to make his peculiar affection a disability. He could not handle a rope in lowering or hoisting boats; he could not go aloft, for whenever he released his hold of a rope with one hand there would be an involuntary release with the other. He states that the coxswain soon discovered his disability and gave him work on deck. The condition first became known to the officers aboard ship in December, 1912, when he was detailed to take notes during

target practice. He could not hold the notebook with one hand and write with the other for the movements of the fingers of the writing hand were accompanied by similar movements of the other hand and made his writing illegible. He was sent to the medical officer and during the examination he was given two pencils and told to write. It was then found that he could write with both hands simultaneously, but the left hand wrote mirror writing. The man had never used the left hand to write with before and did not know anything about the matter.

He was transferred to the naval hospital, Philadelphia, December 28. Examination shows the following condition: Whenever he makes any complicated movements with the fingers or wrist of either hand the other hand involuntarily makes the same movements. Very simple motions, such as flexing or extending one finger, can be made independently, but even then, as a rule, there is a similar and simultaneous movement of the corresponding finger of the other hand. The affection is confined to the muscles below the elbow and does not appear when the upper arm alone is used; neither are the feet and toes affected. He is ambidextrous except in writing; with his left hand he can execute mirror writing only. When he writes with either hand the fingers of the other hand assume the same position and execute the same movements timed exactly with those of the writing hand; when he buttons or unbuttons his clothing or unties a knot with either hand the other hand involuntarily executes the same movements and timed exactly with the used hand. This is done so accurately that it seems impossible that any amount of practice could produce the same result in a normal individual. Many similar illustrations could be offered. By strict attention he can limit to a certain extent the movements of the unused hand but when he does so the movements of the used hand become stiff and not well controlled. As an example, if while writing with one hand he strongly grips the hand of another person with the other, the movements of the writing hand become stiff and cramped and the writing correspondingly poor; at the same time the gripping hand performs a series of spasmodic twitchings timed with the finger movements of the other hand. If he be told to stop the twitching movements of the gripping hand he can do so almost completely for a few seconds but it will be noted that during such control the finger movements of the writing hand have practically ceased and that he is writing almost entirely by arm movements. Normally he does not use arm movements in writing with a pen or pencil.

His previous medical history is good. Physical examination reveals no stigmata of degeneration. There are no remnants of palsy in either hand nor elsewhere in the body. He has no ataxia, tremor, spasticity, disorder of the reflexes, or disturbance of sensibility. He

is not nervous, hysterical, or dissipated. There is no discovered motive why he should want to leave the service. The whole bearing and attitude of the man during his stay in the hospital strengthen the belief that malingering can be excluded.

This man was presented by Dr. Charles W. Burr and myself at a meeting of the Philadelphia Neurological Society. The case was discussed by a number of eminent neurologists but no one offered an explanation of the condition. All agreed that it could not be due to injury or to other anatomical defects. Dr. Burr offered a hypothetical explanation in the development of nerve-muscle control. The little child, when it attempts to move an arm or a leg or any part of the body, moves the whole body. It is only after long training that it can restrict the movement to the one part of the body which it wishes to move. He suggests that normally there may be slowly developed a power of inhibition and that this patient, so far as the hands are concerned, has never learned this inhibition. He suggests also that there may be a complete and total bilateral representation of the hands in the cerebral motor cortex. Dr. Spiller called attention to the fact that associated movements are seen in the palsied hand in hemiplegia in adults. A man may not be able to close the palsied hand by effort of will and yet close it well if he voluntarily close the nonpalsied hand. In these cases the palsied hand does not mimic completely any complicated action in the well hand.

As to the mirror writing, Dr. Burr offers an explanation on physiological grounds which I have since satisfied myself is the correct one. He believes that handwriting by the two hands is not naturally identical, but symmetrical; that right-handed persons would naturally write mirror writing with the left hand and that the same amount of training and practice in the use of the left hand would produce as smooth a hand in mirror writing as the right hand performs in ordinary writing.

Editor's note.—The following is extracted from a letter written by Asst. Surg. R. Sheehan, United States Navy, who first observed this case:

His condition had evidently not been noted before. He had the reputation aboard ship of being a good man, willing and quite capable. In fact it was due to his being recommended for the rating of quartermaster and his endeavor to fill it that his condition became manifest. He found that in signaling he became confused because of his inability to perform synchronously different movements with both hands. He also felt trepidation about going aloft, because in taking the right hand from the ladder it was as likely as not to be followed by the left. This did not always occur. I believe that its occurrence depended more or less upon the degree of concentration in the effort.

There did not seem to be any tendency to associated movement of the right hand when the action was performed by the left. It was noted that the movement was exaggerated by fatigue or nervousness.

The mirror writing occurred when the left hand was used alone, and also when he wrote the same thing with both hands at the same time. It was not found that he could write different words with one hand than with the other at the same time.

Regarding the etiology of associated movements. When pathologic they are invariably due to the fact that the intense motor impulses which escape inhibition are wholly or in part switched off to the neighboring or even more distant muscle areas. This would refer especially to homolateral groups, but no doubt as well to opposite. Attention is called to "intensive," as in ordinary routine work in which the element of fear of his inability did not enter, he seemed to get along very well.

Now as to whether the lesion is cortical or subcortical is difficult to state. It is presumed that the cerebral cortex is the motor organ of higher development and that its efferent impulses are already coordinated. However, we know that coordination is accomplished to a certain extent after the manner of a "reflex." This may be interfered with either in the sensory limb of the arc, in the psychomotor center, in its immediate vicinity, where the centripetal stimulation is transferred to the center, or finally in the motor limb of the reflex arc.

Where stimulation of the cerebral cortex causes a response on one side only the response is on the side opposite to the stimulated hemisphere. It sometimes happens, however, that two groups of symmetrically placed muscles react to the stimulus applied to the one hemisphere only. This must be determined by fibers in the cord.

We know that the fibers of the pyramidal tract subdivide in the cord into collaterals, and it would be a fair presumption to refer the condition to a lesion of the pyramidal tract, say, at the motor decussation.

Regarding malingering. I believe this can be eliminated, there being little reason to suspect it, as the patient had no desire to leave the service, and in fact much regretted that he could not remain. To my mind the condition is congenital.

According to Savage, "mirror writing is met with in some forms of mental weakness, and in conditions of mental disorder allied to the hysterical, occurring in imbeciles, also in cases of moral perversion, where it may only be temporary." It is more easily acquired in highly nervous people. The left handed have a physiological tendency to mirror writing.

TRANSPLANTATION OF BONE.

By C. M. Oman, surgeon, United States Navy.

As most favorable and gratifying results are being obtained in the bone surgery of to-day, it might be of interest to report the following case operated on by the writer at the United States Naval Hospital, Brooklyn, N. Y.:

On April 24, 1912, J. C., fireman, first class, United States Navy, was readmitted from the U. S. S. *Dixie* as with fractura, right tibia, junction of middle and lower thirds.

History.—White, age 46. Gives a history of syphilis contracted in 1908 at Rio Janeiro. Took mercury for one year and was pronounced cured. In October, 1911, mucous patches appeared in mouth. Was given gm. 0.6 salvarsan intravenously. Mercury continued at intervals since.

Has been rather a hard drinker. He looks at least five years older than his real age.

Heart negative, lungs negative, urine shows a few hyaline casts and a trace of albumen.

History of present trouble.—While ashore on liberty in Pensacola, Fla., he got drunk. During a fight his right leg was broken and numerous other contusions received. Was returned aboard the *Dixie* by the police authorities.

The record states that "a civilian doctor had set the leg and placed it in splints." March 24. Leg put in plaster cast. April 20. Cast removed, fracture ununited.

On April 24, 1912, he was readmitted to hospital. Examination showed marked mobility at site of fracture. X-ray examination showed a marked displacement of the fragments with considerable overlapping, also a united fracture of the fibula and a detached fragment of bone of considerable size.

Wassermann negative, but mercury was given.

First operation.—On May 3, 1912, under ether, a 6-inch incision was made over site of fracture, external to tibial crest, in order to get satisfactory tissue that would heal most readily. The soft tissues looked unhealthy, soft, and dark in appearance. The fragments were absolutely separated, overlapping about two inches, and no attempt at bony union had occurred, the points of the fracture being united by fibrous tissue. A large spicule, completely detached and denuded of periosteum, firmly wedged in between the fragments, was removed with difficulty. It had an unhealthy appearance.

The ends were freshened and brought together, but only very small proportions were actually in contact.

A 6-inch Lane plate was made fast by means of six screws, securing a good, firm apposition of the fragments. This plate was placed as far away from the right of the skin incision as possible and in such a position as to be covered with soft tissues instead of only the skin over the shin.

The soft tissues were united by plain catgut and the skin wound was closed by silkworm gut, care being taken not to have the edges inverted.

Dressed in cast which was cut the following day and then retained by bandage.

The wound healed by first intention. Allowed up on crutches on June 1, but was warned not to put any weight on leg.

As the weeks went by the leg continued to look healthy, but there was absolutely no sign of any attempt at new bone formation.

Second operation.—Bone transplantation. On September 19, 1912, under ether, an incision was made over site of original operation. Soft tissues in fairly good condition. The Lane plate was loose, porosis had occurred about each screw, the plate had sunken somewhat into the bone, and the ends of the fragments had undergone necrosis. No sign of new bone. The dead bone was cleaned out as thoroughly as possible and the ends of the fragments sawed off.

leaving a gap of 1½ inches on one side to 1 inch on the other. The medullary cavities were reamed out. While this was being done, Passed Asst. Surg. E. P. Huff, United States Navy, excised 3 inches of the right eighth rib, subperiosteally. Holes were bored through this section of the rib in order to allow a ready access of blood, and then the implant was fixed into place between the fragments of tibia. It was driven into the medullary canal of the lower fragment, and allowed simply to lie in a groove in the upper fragment, as this defect had already been there due to the original separation of the fragment and needed only freshening down to medullary canal. A hole was drilled through and a kangaroo tendon served to hold implant from slipping.

Wound closed in the usual way, catgut for muscles, silkworm gut for skin. No drain. Cast, which was cut the following day.

The case healed by first intention, and progressed in the usual way. Callus began to form, new bone was produced, and at the present writing, March 1, 1913, there is a distinct protuberance of bone at the seat of the original defect, and the skiagram shows a gradual absorption of the rib.

The writer has not seen the case for three months, but reports from the hospital say he is bearing weight on the leg, but, of course, it is still supported by a light cast.

Comments.—This was not a favorable case for operation, either for a bone plate or for transplantation. His specific history, together with his alcoholic habits, rendered his skeleton in a poor resistive or restorative condition. It might be stated that a short time after the first operation be got on a real drunk, having been given whisky by a visitor, and numerous times after that he showed evidence of having taken whisky.

Lane says that in using his plate or any plates in bone work "If a surgeon hopes to succeed in the treatment of simple fractures by operation, he must insure an extreme condition of asepsis of the wound by excluding the skin of the patient from the area of the wound, which should be of sufficient length to allow of free and easy access to the seat of the fracture. He should never touch the wound with his gloved hand, nor with any portion of an instrument that has touched his glove, since gloves may have pinhole apertures in them, and they are readily torn in the use of the heavy apparatus requisite for handling the fragments."

These bone transplantations have to be done on definite principles. (*a*) The fragment must be taken out with or without the periosteum; (*b*) preferably from the same patient; (*c*) if it can not be obtained from the same patient it should be obtained, as near as possible, from a patient of the same age; (*d*) when transplanted, it must come in contact at one or both ends with living healthy bone. It reproduces

best when in contact at both ends. It is better to insert it into the medulla at both ends, but that is not at all necessary.

The rôle which the implant plays is merely that of a scaffold. It always dies. The Haversian canals in the dead bone act as tubes into which the Haversian canals from the living bone, above and below, pass. These Haversian canals carry with them on their walls osteoblasts and osteoclasts. The osteoclasts dissolve the bone that was transplanted, and the osteoblasts make new bone. Then the new bone increases in size and strength as much as is necessary.

PREVENTION OF THE COMPLICATIONS OF GONORRHEAL INFECTION.

By F. L. Benton, surgeon, United States Navy.

While much has been done to prevent the occurrence of gonorrhea in the naval service by the prophylactic measures now well established, there is still more remaining which we may do along the lines of its scientific treatment, more especially in the prevention of its complications. Such a routine if thoroughly carried out will materially diminish the harmful effects of the infection, in fact will usually prevent their complications in the great majority of cases we may have.

The writer does not claim any originality nor yet to dilate upon the treatment of gonorrhea, but to describe a simple routine which has been in practice for some time and has been followed, happily, by an almost complete absence of any complications whatever.

Briefly this routine is as follows:

A patient reporting with a urethral discharge is put through the routine two-glass urine test, familiar to all. In the event of his first urine appearing turbid he is given a hand injection of one-fourth of 1 per cent protargol solution three times daily, retained for 5 minutes by the clock. At the same time santal oil is given internally, 10 to 12 drops t. i. d. He is instructed how to apply the butterfly dressing himself. This silver solution is mild, unirritating, and is little more than a cleansing solution but is as good, is in fact better, than the stronger solutions.

At the end of four days his urine is again examined, and if the turbidity is diminishing he is given a solution of protargol one-half of 1 per cent t. i. d., with the santal oil continued as before. This is to continue for a week, then if the second urine remains clear, the first becoming less turbid and containing mucus shreds, he is given a mild astringent injection of a solution of zinc sulphate and lead acetate t. i. d., with an instillation of 1 c. c. of a 20 per cent solution of argyrol into the posterior urethra, which is retained. These instillations are given two or three times weekly and the santal oil

discontinued. The argyrol solution must be freshly made. It is never to be instilled if over six hours old and can be used even to 40 per cent if fresh. It is then absolutely nonirritating, painless, and then only is efficacious. The use of the gradually increasing strength of the protargol hand injections appears to prevent extension of the gonorrheal infection into the posterior urethra. At times this does occur, the second glass presenting a turbid urine, a danger signal that must not be overlooked. The patient is then put to bed, the protargol and santal oil continued, also urotropin grs. VII or salol grs. V t. i. d., until the second urine is again clear. When this occurs, as it generally does within two, three, or four days, the argyrol instillations are begun. The use of instrumentation to a urethra so recently acutely inflamed might appear at first to be an inadvisable procedure, but my personal experience has been that it is a distinctly safe procedure and worthy of trial.

THE FIRST AID TREATMENT OF BURNS AND SCALDS BY LIVE STEAM.

By ALLAN STUART, surgeon, United States Navy.

During the past two years there have been several boiler explosions on ships of the Atlantic Fleet, the last one occurring on board the U. S. S. *Vermont*. Each one has been attended by loss of life or the serious injury of men but a short time before in the prime of vigorous manhood.

The explosion on board the *Vermont* forcibly impressed me with the idea that it might not be amiss should the first aid treatment of burns and scalds by live steam be brought to the attention of the members of the Medical Corps of the Navy here present, in the hope that all might benefit by the experience of others as brought out in open discussion and perchance be better prepared to meet an emergency which any of us may have to face without a moment's warning.

At 10.48 p. m., November 1, 1912, while the *Vermont* was at anchor on the Southern Drill Grounds, several "headers" on No. 6 boiler in No. 4 fireroom gave away, filling the fireroom with live steam under a pressure of about 180 pounds and having a temperature estimated to be 300° F.

Six men on duty in the fireroom at that time were injured, two fatally. They were at once brought to the sick bay, where they were placed on rubber sheets spread on the deck, their clothes quickly but carefully cut away, and lime liniment applied in quantities.

As soon as possible, those who it had been ascertained were not dangerously injured were temporarily dressed with gauze which had been soaked in carron oil, given one-fourth grain of morphine by hypo, and placed on cots outside the sick bay which had been obtained from

the marine detachment on board. One hospital apprentice was detailed to attend to these patients while all others turned their attention to the two who had been fatally injured.

While the others were being dressed, these two were being continually laved with lime liniment. Strychnine, gr. 1/30 and tr. digitalis, m. 15, was given to each by mouth. They were then wrapped in sheets soaked in carron oil and placed in bed. Such portions of their bodies as could not be covered by the sheets were wrapped with gauze soaked in the oil. Dobell's solution was used as a mouth wash and gargle frequently. Their mouths, tongues, and throats had been severely burned by the inhalation of live steam and gases. A 2 per cent solution of cocaine followed by a saturated solution of boric acid was used to lessen the pain caused by the burning of the conjunctivae in one case. Strong black coffee containing a small amount of aromatic spirits of ammonia was given them as desired. Cold water (not iced) was allowed in small quantities. Both patients had semi-involuntary movements of the bowels, but no urine was passed nor could any be obtained by catheterization. At 3.45 a. m. one patient died.

Before transfer to the hospital ship all patients were given hot baths and redressed. Clean white clothes were then put on. The remaining dangerously injured patient was placed in a running hot salt water bath and kept there for possibly an hour before transfer. Just before he was to be removed he was taken from this bath and swathed in gauze soaked in the carron oil. When placed in the bath, this patient was rapidly falling into a state of collapse. After being in the bath a short time he seemed to recover partially. While being transferred it was seen that he was weakening fast, and he died shortly after reaching the hospital ship.

I give here a brief description of the extent of the burns in each case:

M. V. H., C. P. Third degree burns over entire body. Tongue, throat, and probably lungs burned by inhalation of live steam and gases. Died.

R. M. W., F. 2 c. Third degree burns on arms, legs, and back. Tongue, throat, both eyes, and probably lungs burned by inhalation of live steam and gases. Died.

J. W. N., F. 1 c. Second degree burns on arms, chest, neck, and ears. Recovered.

H. W. C., C. P. Second degree burns on forearms, left hand, face, neck, and ears. Recovered.

M. W. G., F. 1 c. Second degree burns on both hands. Recovered.

C. K. H., C. P. First degree burns on both hands, neck, and right ear. Recovered.

Supplies of carron oil were made quickly by getting buckets of raw linseed oil from the paint shop, slaking lime obtained from the captain of the hold, and using the liquor of the slaked lime. The great advantage in the use of carron oil is the ease and rapidity with which it can be prepared in large quantities, available for the treatment of large numbers of men.

In my opinion, the treatment as described above, which I used with satisfactory results, and from which no disfiguring scars have resulted in any of the cases which recovered, is the ideal first aid treatment for burns and scalds. I have at present not less than 5 gallons of lime liniment on hand, ready for any emergency like the above.

A CASE OF SIX-DAY FEVER.

By M. S. Elliott, surgeon, United States Navy.

R. J. W., ensign, United States Navy, was admitted to the sick list on the morning of January 31, 1913, with the following history:

On the evening of January 29, felt somewhat indisposed; at 4 a. m. on the 30th had a sharp chill followed by fever which continued until the morning of the 31st, when he reported for treatment. His temperature was 102.4°; pulse 82; respiration 20. His face was flushed, eyes congested, and he complained of pain in the back and headache. Tongue coated.

The fever continued until the morning of February 4, when temperature became normal.

During the course of the fever the most marked symptoms were the persistent, rather diffused pain in the back, headache, and anorexia. He was nauseated at times and vomited once or twice. No diarrhea, and bowels moved normally. No skin eruption noted. The flushing of the face and congestion of the eyes were persistent and more marked than in ordinary febrile conditions. Urine normal throughout. Widal made on February 3 was negative.

Blood counts made on February 2 and 4, by Passed Asst. Surg. R. J. Straeten, were as follows:

	Feb. 2.	Feb. 4.
White	2,493	2,234
Poly ... per cent	34	24
Lymph ... do	48	62
Mono ... do	16	16
Eosin ... do	1	1
Trans ... do	1	1

No malarial parasites present.

Diagnosis was based on the following facts:

Presence of the disease in the Canal Zone and in Panama City; period of incubation; the temperature curve; the absence of malarial parasites; negative Widal; absence of characteristic symptoms which might confuse it with dengue; the blood picture.

The treatment was symptomatic.

Six-day fever or seven-day fever has recently been reported in the Canal Zone by W. E. Deeks (Journal American Medical Associa-

tion, Oct. 26, 1912) and by Perry (Public Health Reports, Nov. 1, 1912), and the present case was undoubtedly contracted in the zone, probably in Panama City on the recent visit of the fleet to the zone.

The patient was in Panama City on January 20, for about two hours. On his return to the ship had severe headache with nausea and vomiting. On the 21st, was ashore at Colon for five hours. On the 23d, spent the night in Panama City and slept at the Tivoli Hotel. Drank no water except at the hotel. Drove around the city that night and the next day. Has no recollection of being bitten by any insect.

Deeks gives the period of incubation as about 10 days. Castellani says the period of incubation is unknown.

In this single case the period of incubation is rather definitely fixed from nine to six days, probably the former. I am inclined to attribute the headache, nausea, and vomiting on the 20th to indiscretions of diet.

The clinical history of the case coincides closely with the description given by Castellani under Seven Days Fever, and in the main points with Deeks's cases. The onset was sudden, accompanied with chill, followed by fever; the characteristic temperature curve; the slow pulse rate; normal respiration. Deeks states that the spleen was enlarged in all his cases; there was no enlargement in this case.

The blood picture agrees closely with Castellani's description; leucopenia, polymorphonuclear leucocytes are reduced and the lymphocytes and mononuclears are increased.

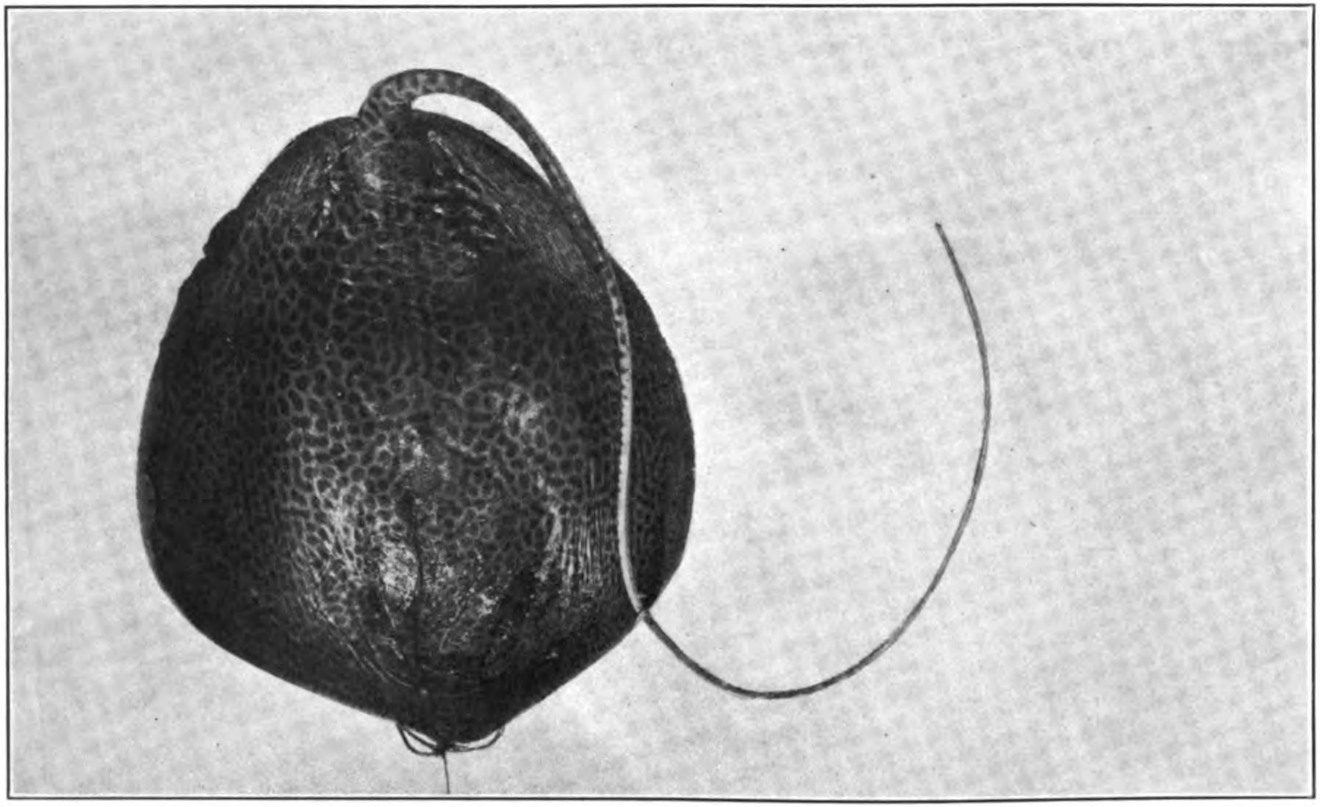
No other case developed on this ship, and it would be of interest to know if cases were noted in other ships of the fleet.

PUNCTURED WOUND OF KNEE JOINT BY THE SPINE OF A STINGRAY.

By N. J. Blackwood, surgeon, United States Navy.

On August 10, 1912, a native Filipino was admitted to the hospital with the spine of a stingray sticking into the right knee joint. The circumstances were as follows: While fishing from a banca lying off Cavite, the patient drew in his net a large stingray [*Himantura uarnak* (Forskål)] measuring about 2 feet in diameter and having a hard bony spine with inverted barb edges, about 6 inches long, situated near the proximal end of its long flexible tail. In endeavoring to release the fish from his net, it fought and thrashed about until it finally drove this spine into the anterior part of his thigh, the spine then breaking off from the tail of the fish and remaining in the wound. On admission patient was suffering great pain and a hypodermic of morphine sulphate had to be given him to keep him quiet. Efforts were made to keep him from bending his knee, but he did bend it

several times and the end of the spine was heard to break within the wound. The spine was found to enter the skin at a point about 3 inches above the upper border of the patella, directed downward and forward toward the knee joint and at an angle of about 45° with the shaft of the femur, the length of the spine within the wound being about 3½ inches. All efforts at extraction were unavailing, as the many small barblike teeth directed toward the distal end on two edges of the spine held the tissues firmly in their grasp. Patient was at once etherized and an incision made from the wound of entrance to the patella and following down the anterior aspect of the spine. This was found not only to penetrate the tendon of the quadriceps but to pass down through the bursa and enter the cavity of the joint. When the spine was freed and withdrawn, it was found that the end was broken off and a search was then made for the broken pieces. Eventually all these were found, six in number, except about one-sixteenth of an inch of the tip, the last piece found being buried in the periosteum of the femur underneath the posterior layer of the bursa. The joint having been opened, the fluid escaped, and fears of infection were entertained; therefore when the wound closed, two small gauze drains were placed in the bursa, one on each side of the joint. Two days after operation, the gauze drains were replaced by rubber tissue, and two days later these also were removed and the wound in the bursa closed at once, there being, neither then nor at any other time, any evidence of infection of the joint. Five days after operation a little pus appeared at the upper end of the skin wound. This increased daily; the wound was partially reopened and a large amount of pus found in the subcutaneous tissues, extending in both directions from the wound of entrance, but entirely superficial. The discharge was very profuse for a week, soaking the dressings daily, but at no time extending into the joint cavity. From then until the wound was entirely healed the discharge lessened daily, and patient was discharged at the end of about six weeks with a perfectly movable joint. At the time of operation the temperature was 101.5° F., and went up the day afterwards to 102.3° F., falling gradually until the seventh day after operation, when it reached the normal and remained there until patient was discharged. Two days after operation the leucocyte count was 13,800, after which it gradually went down until the sixteenth day after operation, when it reached the normal and remained so. The urine and feces were practically normal during the whole time patient was in hospital, the latter containing as usual large quantities of ascaris and trichiuris ova. The laboratory reports of the examination of drainage from the wound showed staphylococcus aureus and albus, and a small nonmotile bacillus, the identity of which was not determined. The interest in this case is chiefly from the unusual nature of the accident, the fact



STINGRAY.

that when cornered a stingray will attack a man, and that there is such great strength in the tail as to cause such a wound; also from the later history, which shows a knee joint penetrated by an infected weapon, freely opened and explored, which remained free from infection while the rest of the wound became deeply infected, and the patient was discharged with a knee joint in practically as good condition as before the accident.

A CASE OF COCAINE POISONING WITH SUICIDAL TENDENCY.

By W. A. Bloedorn, assistant surgeon, United States Navy.

A. M., C. P., returned from liberty and was checked in by the quartermaster apparently in good condition, although his face appeared flushed and he seemed nervous and uneasy. He walked forward on the main deck to the forecastle and suddenly ran to the side, jumped overboard, and started to swim away from the ship; a life belt was immediately thrown overboard and the steam launch, which was just coming alongside, finally succeeded in picking him up. He made no effort to reach the life preserver and fought off the men who were trying to pick him up; they finally got him aboard the launch, but had to hold him to prevent his jumping overboard again. He was brought to the sick bay struggling violently and had to be held in his bunk; severe retching and vomiting set in, and were difficult to control; there was extreme nervousness with jactitation, muscular spasms followed, and there was general rigidity of the muscles with the head retracted. Patient was unable to answer any questions; pupils widely dilated; breathing rapid and pulse somewhat accelerated but of good volume; later pulse became small and feeble, the muscles relaxed, struggling ceased, and he passed into a condition of stupor from which he could not be aroused. It was noticed that he unconsciously went through the act of snuffing as though he was taking some substance through the nostrils.

He was treated symptomatically and stimulants given during the state of depression. The symptoms gradually disappeared and the following morning he appeared normal, except for a little depression, mental and physical.

When questioned in regard to his actions on the previous day he refused to answer or give any reason for them. Finally, after much persuasion, and when accused of taking some drug, he admitted that such was the case and that the had purchased from a Chinese ashore some powders which he called "hops"—this being the general term for drugs such as opium, morphine, cocaine, etc. He stated that he had snuffed several of these powders before coming aboard the ship; that he had been addicted to the use of cocaine and morphine for

about a year, and used the powders whenever he could procure them. He had used the drugs for several months before enlistment and stated that the habit was started from taking a certain catarrh powder, the use of which he had continued for several months. Learning that the active principle of the powder was cocaine, he started using that, and when he could not get cocaine he had gotten a similar effect from morphine.

This case shows an unusually violent suicidal tendency in cocaine poisoning, and also illustrates the well-known danger of the so called "catarrh cures."

POISONING BY PETROLEUM SPIRITS.

By M. S. Elliott, surgeon, United States Navy.

F. J. O'D., O. S., was admitted to sick list on February 20, 1913, with the following history.

He was sent to the sick bay by the captain, whom he had approached on deck and addressed in an incoherent manner, to be examined as to his mental condition.

When first seen he was in a state of active mental excitement. He talked incessantly, in an irrational manner. His face was flushed and eyes bright. Pulse rate slightly increased. No incoordination or staggering.

He was placed under watch in the isolation ward and for about three hours this state of mental excitement continued. After this time he gradually became quieter and rational.

He stated that he was painting in the double bottoms and the last thing he remembered was the light going out. His next recollection was when he found he was in the sick bay several hours later, After the light went out he evidently came up on deck.

On account of the suggestiveness of the symptoms of a more serious mental condition he was kept in the sick bay for several days. There was an absolute clearing up of mental state, and he was sent to duty, well.

The condition was caused by the inhalation in a confined space of the fumes of petroleum spirit used in the paint as a substitute for turpentine.

Treatment was symptomatic.

EDITORIAL COMMENT.

The slight but continued increase in the number of cases of mental disease in the Navy is a subject for serious consideration from the standpoint of service efficiency, as well as from that of pecuniary loss to the Government. The number of these cases stated to be not in line of duty indicates the general opinion of medical officers that in the large majority the disease, or the tendency thereto, exists prior to enlistment. The serious problem of detecting and excluding those of unstable mentality is thus presented to the medical examiner.

Under the most favorable conditions, allowing prolonged observation and repeated examination, the determination of underdeveloped or defective mentality in the borderline cases is exceedingly difficult. Familiarity with the conditions and influences to which a medical officer is subjected in recruiting makes it evident that with his narrow cross section of the man's life, consisting of observation for only a few minutes, he can not hope to detect mental obliquities that would show plainly in a longitudinal section covering a month or more.

For those classed as feeble-minded various tests, notably the De Sanctis and the Binet-Simon, have been under investigation by psychologists and educators with the purpose of evolving a method by which the mental development of an individual can be determined. An article in this number of the Bulletin describes the Binet-Simon test and shows its applicability to service conditions in detecting the feeble-minded applicant for enlistment. No value is claimed for this system in diagnosing mental conditions other than feeble-mindedness, and even here are certain restrictions that greatly limit its practical usefulness.

Its general adoption, in the present state of its development, is therefore inadvisable, but it marks an advance in our methods and is worthy of further trial by medical officers on recruiting duty, who would do well to familiarize themselves with this method, that they may take advantage of its good features while bearing in mind its limitations.

In this connection it may be pointed out that what is coming to be known as "temperamental fitness" is attracting increasing attention, and certain lectures delivered at the Naval War College during the past year indicate that its important relation to the service is recognized. There are persons whose mental processes do not appear

to be individually defective, and yet, when their intellectual activities are applied as a whole, they lack a certain coordination or directive force, which lessens their value or completely unfits them for a military career.

That mental equipment and training for the operations of war are at least as important as material preparation should be continually in the minds of all, and this subject deserves more study in order that methods may be developed and standards established whereby the temperamental types can be classified and those who are desirable can be distinguished from those who are temperamentally unsuited for military activities. This study must be applied equally to officers and men, and it is believed that its active prosecution would be well repaid by the results obtained.

Much can be learned by careful observation of the conduct of officers and men in grave emergencies. The results of such observations should be made matters of record and should be considered along with the temperamental characteristics before assignments to important or independent duty are made. The success of our arms at sea may depend largely upon the temperamental qualifications of the commander in chief. It is believed that no officer should be sent to sea who shows a positive Wassermann reaction, and especially should he be prevented from assuming high command. It is a matter of common observation to see cerebral syphilis develop unexpectedly under mental strain, inducing an unbalanced mind that would be likely to lead to disaster.—(C. F. STOKES, SURGEON GENERAL, UNITED STATES NAVY).

On several occasions efforts have been made to collect biographical data concerning members of the medical corps who during their lives were distinguished for medical or other achievements. These efforts have been handicapped by the lack of any one source from which the facts could be obtained, and prolonged search has been required before information, often fragmentary and incomplete, could be secured. Such experiences have inspired the article on biographies which appears in this number.

The record of the corps and the large number of its members who possessed attainments above the average should be a source of pride and a stimulus to each of us, and to the end that a biographical record of the great men of the past may be secured and preserved before it is too late, it is proposed to collect and tabulate in the bureau such data as can be obtained. Therefore it is sincerely hoped that medical officers will send to the bureau such facts as they possess concerning former members of the corps who have won distinction in any field, so that these records will be available for the biographers of the future.

In connection with the adoption of the revised Forms D and Da several requests for a definite enumeration of the nonexpendable articles listed on the Supply Table of the Medical Department have been received in the bureau. A revised edition of the Supply Table will soon be issued wherein the names of all nonexpendable articles will be printed in italics.

The transfer of property without an itemized inventory, as contemplated by the revised Form D, makes it imperative that all inventories be kept down to date; that they be maintained with accuracy; and that a uniform system of keeping stock account in the medical department be adopted. With this end in view, the use of cards for inventory keeping has been directed, and an initial supply of the cards will be forwarded to all ships and stations from the Brooklyn supply depot at an early date. White cards will be used for expendable articles, salmon cards for nonexpendable articles.

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

A. W. DUNBAR, surgeon, and G. B. CROW, passed assistant surgeon, United States Navy.

SALVATORE, DOMENICO, DOTT., CAPITANO MEDICO. **Diseases observed at Derna among our troops during the Italo-Turkish War and their course.** Giornale di Medicina Militare, Anno LX, Nov.–Dec., 1912, Fasc. XI–XII, p. 801.

Toward the latter part of October, 1911, after Tripoli had been taken and was occupied by the Italian troops, a field hospital of 100 beds was established at Derna. During the first year of its existence 1,483 patients came under observation and treatment. The report, however, also includes the results of observations made in three more of the hospitals that had been established since, namely, in the following December and February, when more troops had arrived. Out of the 1,483 cases of sickness, 596 belonged to the class of infectious diseases. Of these 596 cases, 346 (nearly 60 per cent) were typhoid cases, 106 Malta fever cases, 50 malaria, 58 dysentery, and the remainder consisted of a few cases each of measles, varicella, cerebrospinal meningitis, kala-azar, circumscribed bronchiolitis, lobar pneumonia, and pleurisy.

Typhoid fever.—Our author states that no case of typhoid occurred without its being complicated by bronchopulmonitis, so that he might almost call the disease typhopneumonitis. Otherwise the course of the fever was generally regular and mild. This is attributed by him to a lessened virulence of the germ on the one hand and to an increased diaphoresis on the other, both superinduced by the subtropical temperature.

Malta fever was equally mild, the temperature beginning to decline on the eighth or ninth day, becoming normal after the fifteenth or sixteenth day of the disease. Not rarely, however, this defervescence was but temporary and after two or three days the temperature began to rise again, keeping slightly above normal for weeks and months. Three clinical symptoms are, according to Salvatore, characteristic of the atypical form of this fever, namely, pain over the epigastrium, obstinate constipation, and enlarged spleen. The spleen is not only large but also hard, at times painful, margin sharp. The liver, while tender to the touch, is not itself painful. None of the cases of Malta fever terminated fatally.

Malaria does not exist at Derna, in spite of the fact that all kinds of mosquitoes are present there. The disease is supposed to have

been imported through infected individuals. The observed cases were mostly of the recurrent type, occurring after an apyrexia of 6 to 20 months. The author attributes all such cases to a parthenogenetic development of the parasites from macrogametes stowed away in some remote tissue (marrow of bones), hitherto kept from conjugation with the microgametes. Some cases of blackwater fever were also observed. The author considers quinine a double-edged sword, sometimes causing, sometimes curing, this complication.

Dysentery occurred in both the amebic and the bacillary forms; the latter, however, appeared only in the sporadic form and resembled the Shiga-Kruse type, while 80 per cent of all the cases were due to *Entameba histolytica*, and were very severe. While fever was never absent in the bacillary form of the disease, it was absent in over half the cases of the amebic form of dysentery.

Cirenaica possesses an agreeable climate, very much like that of Sicily and the south of Italy, with frequent and well-distributed rains and, occasionally, sudden changes in temperature. During the winter the temperature is 12° to 15°, during the summer, from June to September, about 25°, so as to make the mean annual temperature 19° to 20°.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

LUZZATTI, A. DOTT., CAPITANO MEDICA DELLA REGIA MARINA. **Two cases of mumps with orchitis and absence of parotiditis.** Ann. di Medicina Navale e Colon., Anno XIX, Jan., 1913, Vol. I, Fasc. I, p. 81.

The author reports two cases of mumps, in which the orchitis was the only glandular involvement; the parotid glands showed absolutely no signs of disease.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

HARRISON, L. W., AND HOUGHTON, G. J., MAJORS, R. A. M. C. **Preliminary note on the treatment of gonorrhea with heated bougies.** Jour. R. A. M. C. Vol. XX, No. 2, Feb., 1913.

The method was suggested to the authors by the following facts: "Under artificial conditions the gonococcus is destroyed at a temperature of 104° F. in six hours and at higher temperatures in a shorter time." "When a patient with gonorrhea develops pyrexia the discharge ceases or an abrupt termination occurs." "The urethra can tolerate a temperature of 114° to 119° F. if the heat is gradually applied."

They applied heat by a water-heated bougie made as follows:

A silver catheter (No. 9–12 English), having no opening at its distal end and an outlet tube near its proximal end, incloses another catheter (No. 2) open at both ends. The inner catheter passes to within an inch of the distal end and protrudes for an inch or more

beyond the proximal end of the outer. The mouth of the latter is sealed water-tight with solder above the former. The projecting inner catheter connects with a water reservoir by a rubber tube, provided with a clip, and the outlet of the outer catheter discharges into a bucket by means of another rubber tube.

A suppository of atropine gr. $\frac{1}{75}$ was administered the night before and again the same morning as the treatment. The urethra was irrigated as usual and the well-lubricated bougie was passed into the bladder, the patient supine. Water at 114° F. from the reservoir, elevated 18 inches, was then allowed to flow through the instrument. The temperature of the water was gradually raised to 118° F. to 121° F., then to 125° F., at which it was maintained for five to ten minutes. At this temperature the outflowing water was 118° F.

The patient bore the maximum temperature with considerable difficulty. The treatment was repeated on two or three successive days and subsequently as indicated by "progress and the presence or otherwise of the gonococcus."

An electrically heated bougie provided with a thermometer has also been used, but is expensive.

Sixteen cases in various stages of inflammation were treated. The organisms disappeared or were greatly diminished in from four to seventeen days. The mucus and epithelium were increased, the discharge changed at once to muco-purulent or muco-serous and in six cases (four acute) it disappeared before the eighth day. The prostate remained normal in acute cases and returned to normal in the chronic. No epididymitis occurred while one existing case was much benefited.

The results of the method encouraged patients to submit to its ordeal and great hope is entertained that its use will prove a distinct advance in the treatment of gonorrhea.—(W. E. EATON, ASSISTANT SURGEON, U. S. NAVY.)

BOEHME, S. F. **The differential diagnosis between pneumonia and appendicitis.** Medical Record, March 29, 1913.

This diagnosis often is not easy and in some cases it is impossible for several hours. The points of differentiation are few until definite signs of lobar pneumonia develop.

Pneumonia simulating appendicitis is the commonest source of error. Pain in pneumonia often is referred to the appendiceal or abdominal regions, especially if associated with diaphragmatic pleurisy, the two pains may be very similar in the adult and in children the two sometimes can not be differentiated. Nausea and vomiting may usher in either condition. Abdominal tenderness, localized in the appendiceal region or general, may be intense in either condition.

Boehme believes that the tenderness is usually more general and more superficial in pneumonia; both conditions may have deep tenderness and rigidity of the right rectus. Fever may be sudden and high in either but that in pneumonia tends to rise more suddenly and to a higher point, except in children. Leukocytosis may be marked in the early stages of either condition and a blood count helps but little. These five classical symptoms of appendicitis may be simulated by central pneumonia with diaphragmatic pleurisy.

The peritonitic facies of appendicitis may be a diagnostic point, but when this appears the condition is past the stage of an early diagnosis. Expiratory dilatation of the alæ nasi in pneumonia is quite characteristic but may be simulated closely in children with appendicitis. Flexion of the right knee and hip are common in appendicitis but rare in pneumonia, unless in the presence of a diaphragmatic pleurisy. Rigidity varies considerably in both conditions, it may be marked or absent in either. Distention and tympanites are present frequently and early in either process, as is constipation. Chill is far commoner in pneumonia, it is early and very marked, while outside of vague chilly feelings, it is rare in appendicitis. Respiration in the two conditions may be very similar but careful observation of it will point to the diagnosis. In pnuemonias it is increased definitely in relation to the pulse, it is catchy, characteristic of pleural involvement, and accompanied by a grunt, especially in children. An early herpes points strongly to pneumonia. Cough indicates pneumonia but frequently is absent. The physical signs of a central pneumonia may be absent throughout the disease.

Appendicitis simulating pneumonia is not such a common source of error, yet in children it may occur readily. With normal lungs there should be no difficulty, but there is an associated congestion of the lower lobe of the right lung in a considerable number of cases of acute appendicitis in its early stages. A blood examination for the pneumococcus is of no value for this organism may involve either organ. In the presence of a previously existing pulmonary involvement the early diagnosis may be entirely confusing and here the history is of great importance.

Pneumonia with appendicitis rarely occurs but should be considered in every case and the abdomen should be examined carefully in every case of pneumonia.

Boehme considers it better to remove a normal appendix with an existing pneumonia unrecognized than to allow a pus appendix to remain, to be recognized too late to save the patient from a general peritonitis. This, however, should not speak for any lack of care in diagnosis.—(L. W. JOHNSON, P. A. SURGEON, U. S. N.)

WEBB, A. L. A., MAJOR, R. A. M. C. **Notes on some experiments made to determine the rate of absorbability and intensity of action of quinine given hypodermically and by the mouth, as shown by the minimum lethal dose method.** Jour. R. A. M. C., Vol. XX, No. 3, March, 1913.

Questioning the applicability of the findings of MacGilchrist, who experimented in India on guinea pigs and reported that oral administation was more prompt and certain than subcutaneous injections (1 in 2 and 1 in 8) except when the latter was in extreme dilution (1–50), Webb worked with small brown monkeys in Sierra Leone, using both the sulphate and bihydrochloride solutions. The quickest action and best absorption is as follows, commencing with the most efficacious:

(1) Injections of 1–8 dilution.
(2) Injections of 1–5 dilution.
(3) Injections of 1–3 dilution.
(4) Injections of 1–2 dilution.
(5) Oral administration with or without fasting.

The effects of the 1–5 solution closely approached those of the 1–8 dilution, so, considering the lesser bulk of the former, it has undoubtedly the most practical value, especially in fulminant cases where rapidity of action and thoroughness of absorption are of vital importance.—(C. N. FISKE, SURGEON, U. S. NAVY.)

HUNT, C. J. **The use of antityphoid vaccine during the course of an epidemic.** Amer. Jour. Med. Sci., June, 1913.

Reports of the use of antityphoid vaccine during an epidemic are meager. Cullinan reports 500 inoculations during an epidemic lasting 5 months. Of those inoculated 1.35 per cent developed typhoid fever, while 14.9 per cent of the uninoculated contracted the disease. Other epidemics during which the vaccine was used uniformly showed its favorable effect.

The writer then describes the recent epidemic at Troy, Pa., in which the disease was water borne, the supply being infected by a carrier.

The population of the borough known to have constantly used the infected water supply numbered 1,343 persons, of whom 229 developed typhoid fever. The use of the vaccine was started October 14, up to which time 127 cases of typhoid had occurred. The water supply was disinfected October 14. Seven hundred and sixty-one persons were then vaccinated, leaving 455 unvaccinated. Of the former 4.86 per cent, and of the latter 14.28 per cent contracted the disease.

Of those vaccinated 35 developed the disease prior to the administration of the third dose. The mortality among the cases occurring

among the unvaccinated was 8.85 per cent, among the vaccinated 0.27 per cent.

The value of the antityphoid vaccine during the course of the epidemic seems to be determined by the time of its use in relation to many factors, the principal ones being:

1. *Abruptness of pollution of the transmitting agent.*—When the infection is abrupt and unrecognized the value is questionable and it should not be used until after the early incubation period is passed or the presence of infection in the individual is excluded by a blood culture. When the transmitting agent is other than water, milk, or ice cream the use of the vaccine is apparently valuable as indicated by military and institution experience.

2. *Degree of pollution.*—When mass pollution occurs the use of the vaccine must depend upon an examination of the individual and his use of the probable source of infection.

3. *Virulence of the specific strain of the causative organism.*—This apparently accounts for the excessive mortality in some epidemics and must be considered in estimating the value of vaccine treatment.

4. *Susceptibility of those exposed.*—It appears as if continued use of mildly contaminated water produces some degree of resistance to infection, which may lead to an overestimate of the value of the vaccine.

5. *Time of use of the vaccine.*—A quickly produced intensive pollution will probably render the vaccine of no value, while on the contrary, with a low degree of pollution, even if abrupt in onset, if each applicant's case is analyzed, the prophylaxis may be advisable.

6. *Number of bacteria used.*—If the individual is in the prodromal stage, the quantity of the vaccine given is important. It is desirable in an epidemic to establish immunity quickly, but to do so by using maximum doses is at any time inadvisable and especially so during an epidemic.

7. *Negative phase.*—This has not been entirely eliminated from consideration although shown to be more theoretical than real. It is inferred from the Troy epidemic that the inoculation temporarily lessens resistance.

8. *Types of vaccine.*—Heretofore only strains of the *Bacillus typhosus* have been used. A study of cases indicates the presence of mixed infections and the vaccine used in the epidemic contained two strains of the *Bacillus paratyphosus*, "which would appear to be of greater value than a vaccine including only the *Bacillus typhosus* strains." (Is this not a return to the old "shotgun" prescription?—A. W. D.). It is stated that the prophylactic vaccine is of use in preventing the secondary cases which generally occur in the aftermath of a water-borne epidemic.

Hunt concludes from the studies made of this epidemic that the vaccine has little value in limiting the number of cases and in modifying the disease in the individual case. [The above conclusions do not appear correct in view of the statement that of the unvaccinated the morbidity rate was 14.28 per cent, the case mortality rate 8.85 per cent, as against 4.86 and 0.27 per cent, respectively, for those vaccinated.—A. W. D.]—(A. W. D.)

BUTLER, WM., M. B., **Measles.** Proceedings of the Royal Society of Medicine, March, 1913.

Measles has undergone no change in its epidemiology through many centuries, as is evidenced by the writings of the early Arabians. Measles and smallpox have always been associated in medical literature due to the natural analogies of these diseases; especially that prior to the introduction of vaccination for the control of the latter disease, hardly anyone escaped these infections.

A record of observations of 14,000 persons has been made to determine the percentage of the population which contracts measles and the incidence of second attacks. Of this number, all of whom were at the time contacts, 78 per cent of all ages had previously suffered an attack of measles. The percentage of prior infection with measles for the age groups rises steadily from 8.4 per cent for 0–4 years to 97.3 per cent for the 15-year group.

Of those previously suffering from measles 0.7 per cent again contracted the disease, while of those not having a history of measles 66.1 per cent contracted the disease. While this indicates that all but 2.5 per cent of the elementary school population of 15 years and under have had measles, it is evident from statistics derived from the public and military colleges that, due to the more careful fostering and lesser gregariousness in these classes at the more tender age periods, there is a lower percentage of infections for the population as a whole.

The age groups over 5 show an increasing apparent decline in susceptibility, probably due to an innate immunity in the individual. Infants under 6 months of age exhibit a marked insusceptibility, the reason therefor not being evident.

Experience shows, however, that the apparent decline in susceptibility does not occur in isolated communities where there has been a prolonged absence of epidemics, as in the South Sea Islands, where all ages are equally susceptible. This suggests the view that lessened susceptibility is due to exposure to attenuated or minor doses of infection.

In the Faroe Islands there was an absence of measles from 1781 to 1846, when an epidemic occurred resulting in 77 per cent of the

population being infected; the aged, with the exception of those who had previously had the disease, being as readily infected as the young.

An epidemic in the Fiji Islands in 1875 ceased only when practically every person had been attacked and caused a mortality of 20 to 25 per cent.

The following deductions are made:

(1) That natural immunity to measles is exceptional.

(2) That after congenital immunity has disappeared the main protection for subsequent ages is conferred by an attack of the disease itself, which immunity is for the most part permanent.

(3) That it is not to be expected wholly to control a disease of such intense infectivity as measles by methods of isolation. While the period of infectivity is short, the fact that it antedates the eruption makes efficient isolation impracticable.—(A. W. D.)

HONAN, J. H. **Clinical Observations of Carbonic Acid Brine Baths on the Circulation.** Interstate Med. Jour., April, 1913.

The author asserts, and refers to the work of numerous physiological and clinical investigators to substantiate his claims, that CO_2 baths do not overtax the heart. Based on the result of a large number of cases observed clinically, and aided by records of blood pressures and sphygmographic tracings taken before, during, and after the baths, he concludes that it is not the strength of the brine nor the carbonic acid that tax the heart, but the temperature and, in a less degree, the duration of the bath.

At 32° to 34° C. the blood pressure is not affected, and this is termed the "neutral zone." From 32° down to 30° C. there is a slight rise in pressure. Below 30° C. the rise in blood pressure becomes marked, and at 26° to 27° C. a maximum rise of 20 to 30 mm. Hg. has been noted. From 35° up to 40° C. the pressure falls. Beyond 40 C. counterirritation sets in and the blood pressure increases.

There are two constant and almost invariable actions of these baths—hyperemia of the skin and increased pulse vloume, with a closely associated but somewhat less constant increase in the pulse amplitude. With this increased pulse amplitude there is decreased diastolic pressure and pulse frequency. The chemical action on the nerve ends by the gas bubbles and the mechanical irritation of the salts (especially calcium chloride) produce a very active dilatation of the skin capillaries, and this, by increasing the peripheral blood space and decreasing the peripheral resistance, greatly diminishes the load on the heart. The slowing of the pulse is indicated in the tracings by lengthened diastole, and the author believes that the increase in the compensatory pause is the best evidence that the

CO_2 baths do not increase the work for the heart, but on the contrary relieve that organ of much of its work by improving the conditions under which it must perform its work.

The effect of these baths on normal individuals can not be applied to cases of cardio-vascular disease, for under the same conditions of the bath a case suffering with only a slight disturbance of the circulatory equilibrium may give a reaction altogether out of proportion to that seen in the normal.

The fine gradation in the administration of these baths admits of their use in almost all forms of chronic cardio-vascular disease. High blood pressure or sclerotic condition of the arteries is no contraindication to their use. The subjective symptoms of the individual patient three to six months after a course of treatment are the best proof of its action.

The author rarely employs a temperature below 30° or above 35° C. The blood pressure readings, particularly in hyperpiesis, have little relation to the general condition of the patient's improvement.

The great efficacy of the baths seems to be due to an improved condition of the sympathetic nervous system and a better vasomotor response.

This treatment, as is almost every form of treatment, is contraindicated in those cases where the reserve of the myocardium has become exhausted.

The reviewer calls attention to the fact that balneotherapy which, aside from its employment by the faddist has so long held a prominent place in Germany, is receiving more attention in this country. The University of Pennsylvania Hospital has recently installed a very complete apparatus for this form of treatment and has secured an experienced instructor in its use. By dissolving the appropriate kind and amount of salts the waters of almost any famous spa can be very closely duplicated.—(G. B. C.)

RIESMAN, DAVID, M. D. **High Arterial Tension: High Tension Hypertrophy of the Heart.** Amer. Journ. Med. Sci., April, 1913.

Riesman discusses particularly a group of hypertensive cases not associated with arteriosclerosis or important renal changes. The symptoms are respiratory or gastric; indigestion, bloating after meals, or shortness of breath. A few complain of vertigo, ringing in the ears, and numbness and tingling in the extremities.

These cases occur in men and women who have, perhaps, lived a little too well. The men are overweight and have an air of youthfulness and vitality; the women are large and have pendulous breasts. The heart is always enlarged, often far beyond what the symptoms

indicate. The hypertrophy is not due to valvular disease. Arcus senilis is often present. The urine may not show anything of importance except perhaps a slight increase in quantity, but the author states that there is a factor of importance which was first called to his attention by Dr. Pratt, of Boston, namely, the 12-hour night quantity of urine is much greater than the 12-hour day quantity. The second aortic sound is accentuated and the first sound at the apex dull and heavy.

These high-pressure cases that do not have visible or palpable arteriosclerosis are prone to anginal attacks, to coronary sclerosis, and thrombosis. A systolic murmur at the aortic area in such a patient (without accompanying signs of aortic stenosis) is ominous of an early extension of the sclerotic process into the coronary artery.

The blood pressure is often startlingly high. Retinal hemorrhages are not uncommon. These cases rarely have apoplexy. The cause of this high-pressure hypertrophy is as yet theoretical.

Treatment.—High pressure is to a certain extent compensatory, and any attempt to depress the blood pressure to its normal for the individual is irrational and harmful. It should be lowered only to the point where symptoms cease. This can be done best by rest, especially mental rest, and by restricting the diet and particularly the purin-containing foods. Venesection often gives almost magical relief from the symptoms. The author urges prophylaxis. Medical officers of health should educate individuals to consult the physician regularly in order to anticipate those insidious diseases of noninfectious nature which when once detected are often beyond cure.—(G. B. C.)

CHAMBERLAIN, WM. B. **The Relation of Bronchial Asthma to Pathological Conditions of the Nose.** Interstate Med. Jour., April, 1913.

Chamberlain reviews the recent literature on this subject. Voltolini, in 1871, first called attention to such a relationship and reported cases of bronchial asthma as benefited or cured by the removal of polypi from the nose. His results have been confirmed by others, and similar fortunate results have been reported in septal deflections, spurs, hypertrophies, adenoids, involvement of the accessory sinuses, etc. Zarniko believes that the supposed spasms are mainly due to irritation in the centripetal paths of the respiratory tract and that among these the nasal are by far the most important. Hertz regards the nasal mucosa as the most common source of the afferent impulse which gives rise to the bronchial spasm. Solow states that although many cases of bronchial asthma do not improve after removal of nasal obstruction experience has shown that such removal is often well rewarded. Joy believes that 30 to 40 per cent of cases of bronchial asthma are due to, or at least are associated with, abnormal

nasal conditions, and he considers a majority of such cases as due to hyperesthetic areas on the septum. Zarniko and Ballenger believe that an asthma can be considered due to nasal origin when it is preceded or accompanied by nasal symptoms; also when it can be relieved or stopped by anesthetic or anemia producing medicaments, such as cocaine or adrenalin.

Operative interference should not be undertaken during an attack. Abnormalities, however slight, should be corrected. Above all, the nose should be thoroughly explored for hypersensitive areas oi mucous membrane. Killian emphasizes four such points—the anterior ends of the inferior turbinates and the tubercula. Satisfactory and even brilliant results have followed, in his hands, the cauterization of these points with trichloracetic acid.—(G. B. C.)

WEBER, F. PARKES. **"Osler's sign" and certain cutaneous phenomena sometimes associated with heart disease.** Quarterly Jour. Med., April, 1913.

In certain cases of chronic or subacute malignant endocarditis circumscribed painful erythematous swellings, varying in size from a pin's head to a small pea, appear in the skin and subcutaneous tissue, especially of the feet and hands. They are intensely tender to pressure and disappear gradually in from three days to a week. Each of these little lumps or spots is apparently due to a localized acute inflammatory exudation around a capillary or arteriole and springs from the lodgment of infective material from a vegetative growth in the heart. They are not to be confused with chronic purpura of malignant endocarditis nor with livedo reticulata and "terminal" erythema of chronic cardiac failure. Osler, in 1908, first called general medical attention to their full diagnostic importance. They occur in the very chronic cases of endocarditis, the so-called ambulatory cases, where a diagnosis is often difficult. Weber has never seen or heard of "Osler's spots" in any other disease, although they might occur in the very rare cases of malignant endarteritis of the aorta or pulmonary artery, which are doubtless of the same infective nature as malignant endocarditis.—(G. B. C.)

JANEWAY, THEODORE C. **Nephritic hypertension: Clinical and experimental studies.** Amer. Journ. Med. Sci., May, 1913.

Even an extended review can not do justice to the author's searching criticism of the various theories relative to the cause of this little-understood condition.

The studies of Richard Bright revealed a coincidence of cardiac and renal disease so striking as to convince him that the disease of the heart must be regarded as the result of the disease of the kidneys;

at the same time he noted the fact that the relationship is by no means a constant one. Speculating on the cause of the cardiac hypertrophy that is associated with renal disease Bright said:

> The two most ready solutions appear to be either that the altered quality of the blood affords an irregular and unwonted stimulus to the organ immediately or that it so affects the minute and capillary circulation as to render greater action necessary to force the blood through the distant subdivisions of the vascular system.

These suggestions contained the germ of such subsequent theories of the phenomena as have received any wide acceptance.

Mechanical theory.—This theory, first advocated by Traube and elaborated by Cohnheim, sought to explain high blood pressure by increased resistance in the kidney itself. It was disproved by the observation that ligation of both renal arteries fails to raise the blood pressure. Loeb propounded the partly mechanical theory that there is a prallelism between the height of the blood pressure and the extent of the glomerular change, but the anatomic basis of this theory has been destroyed by Jores, who, in a careful study of the kidneys from four subjects, found that the two who had shown the highest blood pressure had the least extensive glomerular change. He also cited one case in which the heart was greatly hypertrophied and the kidneys showed scarcely recognizable histologic changes. Bright, and since his time others, have seen many cases of extensive glomerular nephritis without cardiac hypertrophy.

Chemical theories.—Johnson conceived that accumulated waste products due to faulty kidney elimination cause vasomotor spasm and later hypertrophy of the muscular coats of the arteries. Pässler and Heineke performed successive reduction of kidney substance in dogs and found that moderate hypertension follows the quantitative reduction of kidney tissue to about a third of the total. Janeway and Carrel corroborated these findings and further showed that such a hypertension may be maintained for a long period and appears analogous to the hypertension of chronic nephritis of man. The mechanism by which this increased blood pressure is brought about is not understood. Janeway believes with Pässler that it must be associated with increased tonus of the systemic arteries.

Renin.—Attempts have been made to discover chemical substances exerting a pressor effect which could be conceived as accumulating in the blood in kidney disease. Simple retention of urea or other metabolic substances do not accord with the facts. Tigerstedt and Bergman extracted a substance from the rabbit's kidney which they call renin and which, when injected into animals, produced a rise of pressure. Shaw advocated autolysis of the kidney with liberation of some pressor substance of this type as the explanation of hypertension. Janeway dismisses the above theory because of the acknowledged clinical fact that hypertension is the most extensive in those

very chronic types of nephritis in which the breaking down of kidney substance must be at a minimum if there is any at all.

Epinephrin.—Since the discovery by Oliver and Schafer of the remarkable effects produced by extracts of suprarenal gland this field of research has been most extensively studied. Vaquez and his pupils showed the presence of nodular hyperplasia and even of adenomas of the adrenals in cases of hypertensive nephritis, but further anatomic investigations have failed to show a constant relation between the lesions of the adrenals and the hypertension of nephritis or arteriosclerosis. Attempts have been made to prove that epinephrin exists in the blood in increased amount in nephritis with high blood pressure, but in the author's opinion this substance has not been proved to play any part in the maintenance of normal vascular tonus or in the production of states of high blood pressure with or without nephritis.

Clinical facts.—Janeway regards a pressure of over 135 mm. before middle life as suspicious; above 145 as abnormal. In any case a constant pressure of 160 mm. or over is pathologic. The average for women is about 7 mm. lower.

All attempts have failed to correlate the clinical picture, the functional disturbance of the kidney as evidenced by the newer functional tests, and the anatomic changes found at autopsy. When chronic interstitial nephritis is spoken of we have in mind a symptom-complex rather than an anatomic picture and the differentiation of the various anatomic types of nephritis can not be made by the clinician.

Recent studies seem to show that the real disease back of what is called chronic interstitial nephritis is a disease of the small blood vessels, which may or may not involve the kidney, and the lesions of the kidney are secondary manifestations. From the standpoint of physiology the high blood pressure is the evidence of arteriolar disease rather than renal and is interpreted as a sign of abnormal irritability of the constrictor mechanism. Whether the high blood pressure precedes the kidney lesions is not known, but it seems probable that it is primarily dependent upon processes without the kidney.

Gout and hypertensive nephritis are usually associated, and the clearing up of the cause of one will shed light on the other.

Long-standing anuria from whatever cause is usually accompanied by acute hypertension.

Patients with congenital cystic kidneys finally develop the clinical picture of contracted kidney, with hypertrophied heart, high blood pressure, and low gravity urine; and this suggests to the author that the quantitative reduction of kidney substance to the danger point is responsible for the symptom-complex in the manner similar to that in his experiments on dogs.

No theory so far advanced seems to fit the clinical picture presented by amyloid disease of the kidney.

As acute lead poisoning causes marked acute vascular tonus and chronic lead poisoning is known to produce permanent hypertension, arteriosclerosis, and contracted kidney, there is strong temptation to believe that the eventual anatomic vascular lesions are the result of persistent vascular overstimulation. In conclusion, Janeway says: "What are the vascular poisons back of these types of hypertensive disease? That question no one can answer. That epinephrin may be one of them is possible; that it is the only one seems to me improbable. One may say the same for the secretion of the hypophysis. I believe it is likely that different poisons produce different types of hypertension. Excessive stimulation of the central vasomotor mechanism must also play some part in producing the varied clinical picture."—(G. B. C.)

SURGERY.

H. C. Curl, surgeon, and R. A. Warner, passed assistant surgeon, United States Navy.

Virgallita, Mario, Dott. Tenente Colonello Medico. **On the rapid cure of suppurating buboes and of abscesses.** Giornale di Medicina Militare, Anno LX, Nov.-Dec., 1912, Fasc. XI-XII, p. 830.

The author reports the results of his treatment of over 700 cases of lymphadenitis, observed by him between August, 1909 and 1912, by what he terms the rapid cure. By employing this method he was able to obtain definite cures in 88 per cent of his cases; to reduce the number requiring larger incisions to 8 per cent. and those requiring enucleations to only 4 per cent. The mean duration of a cure by the rapid method (puncture incision) was 13 to 15 days; that by the larger incision 30 to 40 days; that by enucleation 40 to 60 days.

The technique employed in the rapid method is as follows: A puncture incision is made with a straight, narrow-bladed bistoury over the fluctuating and most dependent point of the gland, in order to favor drainage. After slight digital compression by which most of the pus is evacuated, the small cavity is washed out with a (0.25 per cent) 1:4,000 solution of bichloride of mercury, injected with a Luer syringe with the needle removed, ending by flooding the cavity with sterile distilled water, until the effluent comes off clear. Then, using the same syringe, a mixture of iodoform and vaseline (10:100), kept ready for use on a water bath at 40 to 42° C, is injected, making sure that the vaseline is neutral in reaction. The injections completed, slight massage is done, in order to effect an equal and uniform distribution of the vaseline within the tissues and the cavity.

Care should be taken that the quantity of the vaseline mixture be not excessive so as not to overdistend the small abscess cavity.

One-half to 1 c. c. is usually sufficient. Finally, the small wound is covered by a pad of some absorbent material, held in place by a bandage. The dressing is renewed every 24 hours and the treatment continued until the secretions become serous or sero-sanguinolent, which, as a rule, occurs at the end of the second week at the latest. At this point, when the cavity becomes small, the quantity of the vaseline injected may be diminished and even omitted entirely, in order not to interfere with the tendency of the parietes to form adhesions; the simple application of sublimate solution will now be sufficient.

Sometimes, especially in cases in which the cavity was small, the author obtained good result by substituting for the sublimate solution a solution of iodine in hot distilled water (hot enough to cause the evaporation of the iodine). With the larger abscess cavities, however, the sublimate solution was always followed by the more rapid disappearance of pus formation and a prompter adhesion of the walls of the abscess than by any other method.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

CACCIA, FILIPPO, DOTT., CAPITANO MEDICO, DIRETTORE DEL 3° OSPELALETTO DA CAMPO, LIBERO DOCENTE, R. UNIVERSILA DI ROMA. **Gunshot wounds of the thorax, observed at Bengasi during the Italo-Turkish war.** Giorn. di Med. Mil., Anno LXI, Jan., 1913.

Frequency.—Of the 446 deaths and injuries occurring at Bengasi, from the beginning of the war up to July, 1912, 32, or 7.4 per cent, were due to gunshot wounds of the thorax, distributed as follows: Deaths, on the field of battle, 14, or 16.1 per cent of a total of 83; injuries, 19, or 5.2 per cent of a total of 363 wounded. The percentage of deaths due solely to gunshot wounds of the chest reaches 42 per cent; this high death rate was due to hemorrhage from heart and the large vessels; no deaths at all occurred from simple penetrating wounds of the lungs. Of the 19 chest wounds, 11 were penetrating, 8 nonpenetrating.

Nonpenetrating wounds.—The author, under this caption, mentions but one case of special interest, namely, where a soft-nosed bullet struck a rib, became deformed, and was thus prevented from penetrating the lungs; demonstrating one of the few advantages which such a projectile has over the hard bullet.

Penetrating wounds.—Only a few typical cases will here be cited.

Case: B. N., commanding the Seventy-fifth Infantry, admitted to hospital on March 12 with a penetrating wound of the thorax, received during an action in the oasis of the "Due Palme." Entrance opening in the third right intercostal space, between the anterior axillary and mammary lines, round, with sharply defined margins,

inverted, but slightly contused and about 5 mm. in diameter. Exit opening in the sixth intercostal space, in the posterior line of the scapula, roundish, regular, of but slightly contused and lightly everted margins, and about 10 mm. in diameter. No hemoptysis, but hemothorax, reaching up to the point of the scapula. Got well under a simple dressing after disinfection with tincture of iodine.

Case: H. H., 50 years of age, brought to the hospital during the night of February 22, having been wounded a few minutes previously and at a distance of only a few meters. Besides some abdominal injuries with vesical and rectal lesions and comminuted fracture of the pubes, he presented the following thoracic injury: Entrance opening, corresponding to the left posterior line of the scapula, three finger breadths below the spine, oval, 20 mm. in diameter, 15 mm. long, contused. The track of the bullet is directed interiorly and externally; the probe reveals a fractured scapula; no exit opening discovered; no hemoptysis.

Case: C. A., wounded March 12 in the oasis of the "Due Palme"; besides a penetrating wound of the abdomen, presented the following thoracic lesion: Entrance opening in the first left intercostal space in the mammary line, with slightly contused and inverted margins, blackish discolored and of a diameter of about 15 mm. There is a slight ecchymosis and emphysema extending, internally, to the median line of the sternum and externally to the axilla; no exit opening. Condition serious, pulse small and frequent, great pallor. There was cough with hemoptysis from the beginning for 4 days, but completely disappearing after the eighth day. There was slight fever for 5 days, temperature reaching 39° on the second day; hemothorax began to disappear after about the tenth day. Treatment consisted in protective dressing with tincture of iodine, ice on chest and internally; proper diet; on March 29 (17 days after the injury) was transferred in excellent condition to the hospital ship *Regina d'Italia*. Cicatrization of wounds occurred aseptically. In a letter dated May 10 patient reports himself entirely well and without any disturbance from the retained ball.

The author's conclusions are as follows:

1. Penetrating wounds of the thorax, when not involving the heart and large vessels, pursue a favorable course, when aid is prompt and judicious.

2. Penetrating wounds of the thorax, caused by the hard jacketed bullets, need not stop individuals with the resistance peculiar to the natives of Libia.

3. Hemoptysis is far from being a constant symptom of injured lungs: while being the rule in wounds caused by soft bullets, it is absent in those caused by jacketed ones.

4. Subcutaneous emphysema follows all injuries by soft lead bullets, but is absent in wounds caused by the hard jacketed bullets.

5. Hemothorax is produced practically in all wounds caused by soft bullets, but much restricted or entirely absent in those caused by hard bullets.

6. No pulmonitis was observed in the thoracic wounds at Libia.

7. Hernia of the lungs is generally slight and yields easily to proper treatment.

8. Except in cases in which the hemorrhage is serious, gunshot wounds of the thorax must be treated conservatively.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

ANTONIO, AMENTA, DOTT., CAPITANO MEDICO. **An account of the clinical history of the gunshot wounds arriving from Libia, treated in the first surgical ward of the principal military hospital at Palermo.** Giornale di Medicina Militare, Anno 1913, Jan., Fasc. I, p. 16.

In this ward were treated, for serious injuries, 356 soldiers and 24 officers; there were, besides, admitted and treated in the hospital 74 surgical cases, among which were 12 officers. The author states that the above statistics comprise all the injuries that occurred in the present war, emphasizing, at the same time, his conviction that even the most serious injuries do well under conservative treatment. We regret that want of space forbids us to do more than mention a few cases, in a summary form.

Wounds of the head.—Case 1: A corporal on the 26th of October received a gunshot wound over the left temporo-parietal region, with retention of the projectile, followed by facial paralysis, right hemiplegia, and aphasia.

Admitted to the hospital October 30 and two days later had attacks of Jacksonian convulsions. Craniotomy was done, the dura mater incised, a cavity, containing pus, metallic and bony splinters, evacuated, after which patient improved rapidly, hemiplegia disappeared sufficiently to enable him to walk, aphasia improved sufficiently to enable him to make himself understood by his companions, the cerebral wound had completely closed at the end of January. At the beginning of February he began to have symptoms of great depression, obstinate constipation, sleeplessness, return of hemiplegia, right side, and of aphasia, symptoms increasing rapidly.

February 13–15, a large abscess in the left hemisphere was evacuated, of the shape of an hourglass and the dimensions of a hen's egg; later, gangrene of the protruding cerebral substance made it necessary to remove large portions of it, and death ensued on the 29th of February. A similar fate seems to have attended all the other brain injuries in which infection from foreign bodies was the undoubted

prime factor, and the long period that intervened between the reception of the injury and the admission to the hospital, during transport, were secondary factors. Some of the injuries of the face, in which bones were fractured, made a good recovery owing to some skillful work done by dental surgeons at the hospital.

Injuries about the chest.—There were 66 thoracic injuries in all, giving a percentage of 20, which is nearly equal to that observed by Sonnenblick, in the Russo Japanese War, and which was 21 per cent. Among these there were 26, or 7 per cent, penetrating injuries. The majority of the nonpenetrating injuries were limited to the soft parts, although a few were complicated by fractures of the ribs. All the penetrating thoracic injuries gave rise to hemathorax, which was completely absorbed at the end of 30 days; in 9 cases thoracentesis had to be performed and a mean quantity of 500 c.c. of bloody fluid evacuated, after which recovery was rapid and complete. Cases of peculiar interest were the following:

C. B. received a bullet which, after penetrating the upper third of the left forearm, followed by radial paralysis, entered the chest through the fifth left intercostal space, making its exit through the right fourth intercostal space, along the posterior axillary line. He had right hemothorax which was partly evacuated, while the rest was absorbed, the wound healing normally.

P. R. received a bullet over the left acromial region, with hemorrhagic effusion down to the angle of the scapula. The projectile, after passing through the chest, was arrested in its course at a point corresponding to the left lumbar region, whence it was extracted in the field hospital by a cutaneous incision. Thoracentesis was performed and patient recovered, with paræsthesia of the last phalanges of the left hand.

In only three cases was hemothorax followed by pyothorax.

Injuries to the vertebral column.—Such injuries were attended by the highest percentage of mortality, 5 out of 7 proving fatal within a short time, under symptoms of paraplegia, more or less complete, loss of sensation, incontinence of feces and urine, decubitus, and even gangrene of the extremities. The symptoms in these cases were the more serious the higher up the injury was located.

Abdominal injuries.—There occurred altogether 20 abdominal injuries, four of which being penetrating. Examples of cases:

P. T., entrance opening over the left hypochondrium, over the anterior axillary line, 2 centimeters below the costal arch; exit opening along the paravertebral line near the second lumbar vertebra. Wounded on March 11 at Tabruk and at once removed to the field hospital; pulse small and frequent, severe pains over left hypochondriac region. Treatment: liquid diet, ice, and rest, with a grain

of opium daily; patient left his bed on April 10 and the hospital on the 18th, completely cured.

E. G., received two gunshot wounds, one in the right gluteal region, the other on the left flank, with an entrance opening with brownish, inverted margins and an exit opening with irregular and everted borders over the left gluteal region. Arrived at the field hospital in a condition of shock; abdomen distended and painful to pressure. On the day following admission there was retention of urine, temperature 37.1°, small and frequent pulse; received a hypodermic of salt solution, his abdomen was immobilized, a hypodermic injection of morphine and ice over the bladder. During the night experienced nausea. Hypodermoclysis was repeated several times on succeeding days. Nausea and sighing ceased and the temperature became normal six days later. On the 10th day was free from pain, the wound healing normally. On the 19th day was transferred to hospital ship, arriving at the hospital on the 26th in good condition; left the bed at beginning of April and was discharged cured on April 14.

The third case concerns P. B., who received a ball, entering the left hypochondriac region in the anterior axillary line; there were serious signs of peritoneal trouble, the abdomen was immobilized and five days later he was transferred to the hospital, in which a radiogram was taken, revealing the presence of a Mauser bullet on the internal surface of the left iliac fossa; this, not giving any inconvenience, was left in situ and patient was sent home well. The fourth case with a penetrating wound of the abdomen concerned H. G., who was wounded on April 23 and exhibited only a wound of entrance over the left hypochondrium with peritoneal tenderness. He received a hypodermic of morphia and ice over the abdomen; a week later the peritoneal symptoms ceased and he was transferred to the hospital, where, on deep palpation, pain was found over a point corresponding to the right iliac fossa. A radiogram revealed the presence of a large bullet, which, not causing any inconvenience, was left in situ and the patient discharged.

Wounds of the extremities, especially those concerning the soft parts, were numerous, getting well rapidly, some without surgical intervention, which latter circumstance is attributed to the free application of the tincture of iodine at the first-aid stations. In a few cases, on account of the length of the track of the bullet and the introduction of pieces of infected clothing, special treatment had to be used. Altogether 41 bullets were extracted, some producing fractures more or less comminuted, requiring the usual treatment.

The author feels certain that, following the principles of conservative surgery, he was able to save many a limb which seemed at first sight almost sure of destruction through infection; but three amputations were performed.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

CLARKE, COLIN, CAPTAIN, R. A. M. C. **The sterilization of skin and wounds.** Jour. R. A. M. C., Vol. XX, No. 4, April, 1913.

After enumerating the many disadvantages of iodine solution for work in the field and in extemporized hospitals, Clarke declares in favor of a 1 in 500 solution of mercury perchloride in methylated spirit as being just as effective and less painful, adapted to wounds and delicate regions of skin and mucous orifices as well as the operators' hands, and finally, as less expensive. He used it in 131 operations of all kinds, including laparotomies and arthrotomies of knee joints, with good results. He has had made a cylindrical vulcanite 2-ounce container with screw top, to which is attached a brush; this "vulcanite pocket wound sterilizer" can be carried in any position in the pocket and will remain intact indefinitely.—(C. N. FISKE, SURGEON, U. S. NAVY.)

HERTZ, A. F. **Bastedo's sign: A new symptom of chronic appendicitis.** Lancet, March 22, 1913.

This sign was described by Dr. W. A. Bastedo, of New York, in 1909, and its value has been confirmed by many surgeons since that time.

It depends on the production of pain and tenderness in the right iliac fossa on inflation of the colon with air. A rectal tube is inserted and the patient then turns on his back; air is slowly pumped in through the tube until the colon is seen to distend. A normal individual feels a diffuse discomfort in the lower part of the abdomen, but there is no pain unless an excessive quantity of air is introduced, and in this case it is not more marked on one side than on the other. There is also no tenderness. Patients having appendicitis generally experience pain in the right iliac fossa, even though it has been confined hitherto to the epigastrium or the neighborhood of the umbilicus. Whenever pain is produced, well-marked tenderness is found in the neighborhood of McBurney's point. The pain is sometimes referred to the epigastrium when pressure is exerted in the right iliac fossa after inflation.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

DEPREE, H. T. **Adrenalin in chloroform anæsthesia.** British Med. Journ., April 26, 1913.

Operation for deflected septum on a healthy male adult, all organs apparently normal. After light chloroform anæsthesia was induced injection of 5 minims of a 1/1000 solution of adrenalin was administered; death followed about one minute later; stimulants, artificial respiration, and cardiac massage were of no avail. Post-mortem examination showed nothing abnormal.

Experiments on cats under light chloroform anæsthesia have shown that after the injection of small doses of adrenalin into a vein the heart at first beats more rapidly and forcibly, incoordination follows, and then cessation of the beat due to ventricular fibrillation. Under deep anæsthesia the effect of the adrenalin is much less marked and soon passes off, and the heart continues to beat normally. Under ether anæsthesia no effect is produced by the injection of adrenalin. Collapse has been reported following injection of 6 minims of a 1/4000 solution of adrenalin in a patient anæsthetized with a chloroform-ether mixture; recovery followed.

If the injection of adrenalin be made just before the anæsthetic is given no bad results follow. The danger is less under deep anæsthesia than when anæsthesia is light.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

COOLEY, T. B., AND VAUGHAN, J. W. **A simple method of blood transfusion.** Jour. Amer. Med. Assn., February 8, 1913.

In many cases where this procedure is necessary it is made difficult by the small size of the vessels or absence of the necessary equipment. In this case blood was taken from a vein of the donor in a glass syringe of 10 c. c. capacity and immediately injected into the opened vein of the recipient; this was repeated several times with excellent results. The ease and rapidity of the method were impressive and the quantity of blood transferred could be measured and controlled accurately. Such a procedure could be carried out on many occasions when the necessary skill or equipment for direct transfusion might not be available.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

CUMSTON, C. S., M. D. **Excision and suture in the treatment of dense, close urethral strictures.** Annals of Surgery, April, 1913.

Most strictures yield to simple dilatation or dilatation following internal urethrotomy, but the same can not be said of the traumatic variety. Opinion seems to be unanimous as to the utility of resection, but many methods of reconstruction are advocated. After noting the usual methods and condemning the post operative use of a catheter left in the urethra and pressing on the site of the reconstruction, he describes his method.

The operation comprises four steps: (*a*) Opening the canal, (*b*) resection of the stricture, (*c*) repair of continuity, and (*d*) deviation of the urine. If stricture is passable, use Syme conductor with a conducting bougie; if not, clear by dissection, using retrograde catheterization if necessary. Sclerotic tissue surrounding canal is removed, particular care being given to cleaning the region and

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obtaining a clean-cut section of the anterior and posterior ends of the canal. Hemorrhage is not bad and as much as 6 c. m. can be removed, though reconstruction is much more difficult when a large amount has been removed. When resection is accomplished the posterior part of the urethra is dissected out to a short extent, not more than 1 or 2 centimeters, while the anterior end is, on the contrary, freed for 3 to 5 c. m. The ends should come together without needing much traction. Stop all bleeding, bring down outer end, and insert a catgut suture in the periurethral tissue on each side; this enables the ends of the urethra to be brought in contact without effort. Begin by placing two fine catgut sutures in the anterior portion of the urethra, without including the mucosa, and then through the posterior end. A large sound is passed into the bladder and the two sutures tied. The remaining sutures are inserted with the sound in place. The urethra being sutured with knots outside, the posterior end is incised longitudinally at a distance of 1½ c. m. posteriorly to the point of repair and a catheter passed into the bladder through this "buttonhole"; two sutures will hold it in position. The wound is closed, except for the opening through which the catheter passes. In impassable strictures requiring retrograde catheterization and in impassable strictures seated far back, suprapubic deviation becomes necessary.

The author reports very satisfactory results from this operation.—(H. C. C.)

ROBERTS, J. B., M. D. **Operative fixation as a cause of delay in union of fractures.** Annals of Surgery, April, 1913.

The author likens the tendency to frequent operative interference in fractures to the zeal displayed some time ago in removing sclerotic ovaries, in needless nephrorrhaphies, thyroidectomies, and tonsillectomies.

A number of cases of death following fixation of closed fractures of the femur have been reported.

In order to determine whether plating of fractures tends to retard union, the author has reviewed the recent literature on the subject quite thoroughly and has been struck with the number of surgeons who believe that the opening of a closed fracture for the purpose of establishing an anatomical correction of a deformity has a tendency, not to shorten, but to lengthen the time of consolidation of the broken bone.

The intention of the article is not to discourage necessary direct fixation in fractures which are difficult to reduce and hold in place, but is rather a plea for caution against the enthusiastic adoption of this method of treatment as a routine means of dealing with closed fractures.—(H. C. C.)

VAUGHAN, G. T., M. R. C., U. S. N. **The arrest of hemorrhage from bone by plugging with soft tissues.** Annals of Surgery, March, 1913.

The author advocates the use of a fragment of soft tissue to stop hemorrhage from bone: "The method consists in cutting a fragment of soft tissue, muscle, or fascia, preferably muscle, from any convenient place in the field of operation and applying the fragment to the bleeding surface or edge of the exposed broken or cut bone by means of the fingers." If the tissue does not heal well, rub it in with knife handle, dissector, or chisel.

The advantages are, its being always present, not requiring special preparation and its not acting as a foreign body. It is considered as always efficient.—(H. C. C.)

JACKSON, J. N., M. D. **Membranous pericolitis and allied conditions of the ileocæcal region.** Annals of Surgery, March, 1913.

This exhaustive article is deserving of the most careful study by all medical officers, whether they are particularly interested in surgery or in internal medicine. The author has called the attention of the profession to conditions occurring in the right side of the abdomen, causing a definite group of symptoms, often misinterpreted, and frequently necessitating surgical interference for their relief.

Since the author's original paper, read in 1908, many articles have been written concerning these conditions, and both etiology and treatment are matters of great difference of opinion. He refers to the three opinions as to origin—(1) congenital, (2) mechanical, and (3) inflammatory. In favor of the congenital theory we have the parallelism of the vessels of the membrane, very similar to those in the omentum, its noninflammatory structure, its lack of adhesion to the underlying intestine, and its occasional fusion with the normal omentum. Against this theory is the adult development of the condition, no cases having been reported in children. This is explained by assuming that in early growth of the gut the membrane is sufficiently lax to permit freedom of peristalsis. Later on, the gut being lengthened by growth or weight of stagnant feces, the membrane fails to stretch correspondingly, and hence begins to become a source of restriction and obstruction.

The principal mechanical cause is, according to Lane, constipation, from which all degrees of responsive adhesions, bands, and membranes may follow. These bands and membranes are considered as conservative processes under ordinary conditions, but admittedly may become obstructive. Most writers, however, consider that something more than mere constipation is necessary for the formation of these structures.

Those who consider inflammation as the cause claim that frequently recurring low-grade inflammations would produce these lesions, and also that often the peritoneal reaction is from infection within the colon. These may be cases of chronic colitis or oft-repeated or long continued mild infections of the peritoneal covering of the cæcum and appendix.

Histologists and pathologists do not verify this and do not find evidences of these changes in the gut, even in cases where a well-marked membrane is present.

Symptoms.—These are (1) pain, (2) tenderness, (3) constipation, (4) bloating by gas, (5) mucous diarrhea, (6) gastric disturbances, (7) loss of weight, and (8) neurasthenia.

Pain is the dominant symptom, may be severe or no more than distinct distress, is usually progressive, and often becomes constant. It is usually diffuse over the right side, and is not, as a rule, accompanied by elevation of temperature, change in pulse rate, or leucocytosis.

Tenderness is usually diffuse but without any attendant rectus rigidity. Distinctly localized symptoms, such as tenderness over gall bladder or McBurney's point, are usually lacking.

Constipation is marked and is accompanied by the usual symptoms of toxic absorption.

Bloating by gas: This is a marked symptom, is most noticeable in lower abdomen, and at times may be relieved by proper massage to relieve the cæcum and colon.

Mucous diarrhea alternates with constipation in many long-standing cases.

Gastric disturbances cause many cases to be diagnosed gastric ulcer or chronic gastritis. Mr. Moynihan says: "In my own experience the commonest site of a gastric ulcer is in the right iliac fossa, and I have no doubt that in the majority of the cases which form the basis of the text of the very careful and elaborate treatises by the physicians of all lands upon gastric ulcer, no morbid process of this this kind was present." Loss of tone and weight with neurasthenia are the natural accompaniments of the condition.

Differential diagnosis from (1) chronic appendicitis, (2) gall bladder diseases, (3) gastric ulcer, (4) ovarian disease, (5) chronic colitis, (6) Lane's kink, and (7) kidney stone is to be made.

Treatment.—The author considers that some cases can be treated by diet, massage, and colonic irrigation, but in most cases the treatment is surgical. He reviews Mr. Lane's work, but does not approve of such extensive resections of the cæcum and colon as are advocated by him. He refers to the relief obtained in some cases by a cæcostomy or appendicostomy, but deplores the necessity of maintaining a constant vent in this region.

Wilms's work and that of other German surgeons, which considers that cæcum mobile is the principal factor in causing these symptoms, is considered and given credit for being of benefit, but not meeting all indications. Plication of the cæcum is considered as better than pocketing into a space made beneath the lateral parietal peritoneum.

The author's own method is by stripping the membrane as much as is indicated, thereby removing constriction and allowing unobstructed peristalsis. He reports most excellent results from this method, but at present adds cæcal plication to remove the lack of muscular tone in the long distended cæcum. He urges that each case be studied and thinks that it will be necessary at times to use different operations to meet the indications found. One other method is mentioned as being of value in cases where relief is not obtained by stripping, etc. This consists of anastomosis between the cæcum and sigmoid; it would seem that the procedure is not difficult and that a vicious circle, due to retrograde peristalsis, is impossible.

This article, by Dr. Jackson, is very comprehensive and is well worth careful reading.—(H. C. C.)

DEAVER, JOHN B., M. D. **Acute perforation of duodenal and gastric ulcers.** Annals of Surgery, May, 1913. Vol. 57, No. 5.

The deductions from 25 cases of ruptured ulcer of the duodenum or stomach occurring under the author's observation within the past six years are given:

In discussing the occurrence of perforation at the various usual sites of such ulcers those of the duodenum and those on the anterior wall of the stomach are given as producing the most typical symptoms because of the fact that these ulcers, on account of anatomical relations, less frequently set up a localizing inflammation capable of forming adhesions and isolation. Perigastritis, binding the posterior gastric wall to adjoining viscera, on the other hand, frequently prevents perforation of posterior gastric ulcers into the general peritoneal cavity.

Symptom complex. A history of recurrent periods of indigestion through years, the present one culminating in the condition at hand. Shock is present very early in 50 per cent of the cases. Patient writhes in pain, "expending his slight reserve force in attempting to obtain partial relief." Abdomen is scaphoid and skin cold, clammy, and cyanotic, pupils dilated, and temperature normal or subnormal, with pulse little increased but small. Pains come on suddenly and are of agonizing character, beginning in the pit of the stomach, soon becoming general. In duodenal cases the pain begins a little to the right of the median line, later becoming general, and finally descending to

right abdominal quadrant. Contraction of the abdominal walls and diaphragm bring on paroxysmal retching and vomiting with indescribable pain. Vomitus rarely contains blood and is of small amount. Abdominal rigidity is intense and over the point of rupture boardlike; it is the most characteristic and invariable localizing sign. Under anæsthesia the rigidity of the muscles directly over the perforation is the last to disappear. Tenderness is general over the abdomen, but exquisite over the upper abdomen. With the scaphoid rigid abdomen the escape of a small amount of gas obliterates liver dullness. Peristalic sounds are absent usually over entire abdomen but always over upper half.

Treatment.—Operation, closure of the perforation, infolding of the duodenum producing complete isolation of the ulcer-bearing area and posterior gastro-enterostomy.

The author believes firmly in the primary gastro-enterostomy against its performance at a secondary operation.—(R. A. W.)

HESSERT, WILLIAM, M. D. **Some observations on the anatomy of inguinal hernia with special reference to the absence of the conjoined tendon.** Surgery, Gynecology and Obstetrics, May, 1913, Vol. XVI, No. 5.

The frequency of inguinal hernia in the service lends special additional interest to this article. The author reviews the anatomy of the normal inguinal canal and says that anomalous departures from the normal in reference to the absence or maldevelopment of the conjoined tendon of the internal oblique and transversalis is not of such rare occurrence as the scant mention of it in an otherwise voluminous literature on inguinal hernia would lead one to believe.

Coley is quoted and heartily agreed with in the following statement:

> At present we are beginning to appreciate the fact that the great predisposing cause in all inguinal and practically the majority of femoral hernias is a congenital or preformed sac.

Clinically, however, this condition can not be diagnosticated.

Dr. Hessert gives the following condition as evidence of a predisposition:

> Clinically the external ring will be found large, and the canal will admit the finger for a considerable distance. There is felt a distinct impulse on coughing or straining, and by sweeping the examining finger up and down with its palmar surface turned toward the median line the absence of the conjoined tendon can readily be determined, and in its stead the blunt edge of the rectus is felt.

In those cases with a hernia on one side and the above condition on the other it is considered justifiable to operate both sides. At operation the unruptured side presents anatomically a thin external oblique, a thin, poorly defined conjoined tendon or, more frequently, no conjoined tendon, fibers of the internal oblique and transversalis

passing directly inward to be inserted high on the rectus. Thus a very weak triangle is formed, the base being the rectus and the sides the internal oblique and transversalis on the one hand and Poupart's ligament on the other. Its apex is at the internal ring and its floor is the transversalis fascia. Unrecognized hernia is sometimes found to be present, there being a formed sac, or more frequently a potential sac is found. Thus is demonstrated the presence of the great predisposing cause—potential sac.

Since a typical Bassini is impossible on account of the tension required to bring down the internal oblique and transversalis, the author advises Andrews's imbrication of the external oblique—the external oblique fascia, and as much of the muscle as possible being brought down to Poupart's ligament. When the gap is larger, Bloodgood's operation of bringing down fibers of the rectus through its incised sheath will give the necessary support.—(R. A. W.)

MURPHY, JOHN B., M. D. **Osteoplasty.** Surgery, Gynecology and Obstetrics, Vol. XVI, No. 5, May, 1913.

Murphy has as a result of his work since 1903 in osteoplasty formulated the following laws concerning growth of transplanted bone when absolute asepsis has obtained:

1. (*a*) Normal periosteum completely detached from bone and transplanted into fat or muscle tissue in the same individual may produce permanent bone deposit, provided osteoblasts are attached to the periosteum and the patient be young. The presence of osteoblasts is absolutely necessary, as the function of the periosteum itself is limitation and not osteogenesis. (*b*) Transplantation of normal periosteum from one individual to another rarely if ever produced permanent bone, as absorption sooner or later occurs. (*c*) Transplantation of different species never forms permanent deposits.

2. Strips of periosteum left attached to healthy bone at one end but turned into the tissues produce usually permanent bone on the under surface at the osteo-periosteal angle and are an etiological factor in exuberent calluses. Osteoblasts, however, must be present on the strip.

3. Bone deposit at the osteoperiosteal angle rarely occurs when normal periosteum is passed from one to another of the same species, though one end be attached to the freshened surface of healthy bone. Production throughout the length of the strip never occurs.

4. Where bone with attached periosteum is transplanted in the same individual, but without bony contact, reproduction for a time may occur, but complete absorption always follows except in infants or on the very young. Transferred to a different species it is always absorbed.

5. Free bone without periosteum always dies and is absorbed.

6. Bone with or without periosteum transplanted in the same individual and in firm contact with living osteognetic bone at one or both ends acts as scaffolding for the reproduction of new permanent bone. Regeneration occurs throughout the scaffold of bone by osteoclastic absorption of the transplant with coincident osteoblastic deposit. The resultant bone taking the place of the transplanted bone reproduces the size and shape of the original bone, and it is of the strength required by nature to meet the normal strains. If one end of the transplant is in a joint cavity and the original capsule properly replaced and the muscles attached in approximately their normal relation reproduction of the head and bony eminences is practically identical.

7. The function of the transplant is purely conductive. Osteogenesis occurs by deposits from osteoblasts traveling along with the Haversian vessels from the osteogenetic bone into the Haversian system of the transplant. Deposit and absorption go hand in hand until ultimate reproduction on the one hand and complete absorption on the other is completed. The size of the transplanted bone is of no moment in the rôle of reproduction or absorption.

8. Bone reproduction is produced in exactly the manner as in the normal growth of bone—by piling up lamellæ upon lamellæ with the periosteum acting as a limiting membrane whose bone-depositing properties are dependent entirely on attached osteoblasts.

9. Joint function in normal motion is maintained by firmly suturing the controlling muscles around the graft in approximately their normal relation.

10. The interposition of any tissue, even periosteum or cartilage, absolutely prevents union; firm contact between living bone and living bone, at one end at least, is absolutely essential.

11. Destruction of the epiphysis in a long bone prevents growth in the length from the transplantation unless an epiphysis is included in the graft at the point required. One observation by X rays in a young patient showed osteogenesis in the transplanted epiphyseal bone.

12. When an entire shaft, such as the tibia or humerus, is lost, bony contact between the neighboring bones must be provided and arthroplasty subsequently resorted to, to restore a movable joint.

The indications for transplantation are summed up:

1. The correction of developmental deformities, as aplasia of the bones of the extremities, nasal bones and the jaw.

2. To produce union of ununited fractures of any length standing and any origin—congenital or traumatic.

3. To fill gaps produced by destructive infection.

4. To restore parts destroyed by fracture.

5. To fill in gaps after removal of nonmalignant growths.

6. To replace bone lost by removal of encapsulated malignant neoplasms.

The tibial crests furnish the best grafts giving any required length and the defect in the tibia quickly fills in. The average size used measures $\frac{3}{8}$ by $\frac{1}{2}$ by $\frac{5}{8}$ inch, the sides being unequal, and the length may be up to the full length of the tibia from tubercle to malleolus. It should be of such strength as to resist muscle contraction after operation, but Buck's extension may be desirable in some cases.

Special and extensive considerations are involved in the treatment of cases coming under each of the separate indications for transplantation. For instance, in the management of a case of osteomyelitis, here must be considered the preservation of length by the insertion of a magnesium bar or other suitable material, when indicated, removal of sequestra and formation of involucra, the prevention of mixed periostial infection, and the necessity of preserving the epiphysis in children. The destructive infection must have entirely cleared and the limb be entirely healed before transplantation be undertaken.

In operations for dislodged fragments by fracture, the fragment itself may be utilized at once as a graft, as in making a detached and dislodged humeral head to the shaft after freshening. The fragment acts as a transplant, the new bone being deposited through it and entirely replacing it.—(R. A. W.)

HYGIENE AND SANITATION.

C. N. FISKE, surgeon, and R. C. RANSDELL, passed assistant surgeon, United States Navy.

LEHMAN, KARL B., AND DIEM, LUDWIG. **The action on man of vapors of technical and hygienic importance. XXX. Nitric acid.** Arch. Hygiene, 1913, 77, 311–322.

The toxic symptoms on animals of air contaminated by nitric acid are not particularly characteristic, and are similar to those produced by other irritant substances, such as hydrogen chloride, sulphur dioxide, etc. Three cats died in the respiration chamber in 35 to 120 minutes in the presence of 0.5 to 0.73 mg. of the acid to 1 liter of air. Two animals recovered after doses of 0.43 to 0.5 mg. and one survived until the next day with a dose of 0.88 mg. after remaining in the presence of the air-acid mixture for 200 minutes. The post-mortem examination showed no marked inflammation of the mucous membrane of the eyes, nose, or mouth, or edema of the glottis. The bronchial passages were, however, hyperæmic and the lungs exhibited edema.—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

Lehman, Karl B., and Hasegawa. **The action on man of vapors of technical and hygienic importance. XXXI. The "nitrous gases": Nitric oxide, nitrogen dioxide, nitrous and nitric acids.** Arch. Hygiene, 1913, 77, 323–368.

A summary is given of a number of cases in the literature describing the toxic symptoms produced in man by the "nitrous gases," which act essentially as a mixture of nitrous and nitric acid. Attention is called to the great differences as regards the susceptibility of individuals to the poison. Experiments were carried out on animals with gas made by the action of nitric acid on copper. This was diluted with hydrogen and mixed with air. An apparatus is figured to show how this was accomplished, and how samples of the air to which the animals were exposed could be removed for analysis. The analysis was accomplished by passing the air, first, over hydrogen peroxide, when the nitrous acid was oxidized to nitric acid, and the total nitrate, both preformed and produced by oxidation of the nitrous acid, was precipitated by nitron. The gas unabsorbed in the first absorption apparatus was passed through a second apparatus containing potassium iodide, and the iodine set free was titrated by thiosulphate solution. The general result of the experiments with mixtures of equimolecular proportions of nitrous and nitric acid is to show that the mixture acts as if all the nitrogenous products were in the form of nitric acid (see preceding abstract). In the majority of the animal experiments the toxic symptoms were different from those in man. These were generally only slight inflammatory reactions on the mucous membranes, edema of lungs, in certain experiments, methæmoglobin formation, and indications of an action on the central nervous system. The temporary recovery after removal from the noxious vapors, with subsequent relapse, as is observed in the case of man, occurred seldom in the case of animals. Experiments on man (Hasegawa), but carried out with only small doses of the noxious vapors, indicated that the symptoms were similar to those on animals. Various experiments were also carried out on the reduction of nitrate to nitrite by animal tissues, on the distribution of nitrites in tissues after injection into the trachea, and on the toxic effect of nitrite administration. It was shown that the quantities of nitrite which produced severe symptoms after inhalation were far smaller than the quantities necessary to produce characteristic nitrite poisoning. The injurious effects in the inhalation experiments are to be ascribed to the production of the lung edema. In man there is a latent period before the injurious effects are observed, which is generally absent in the case of animals.—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

MASSEE, G. **On the discolored spots sometimes found on chilled beef, with special reference to "black spot."** Jour. Hygiene, vol. 12, No. 4, December, 1912.

At the Jodrell laboratory investigation was undertaken to determine the nature and sanitary significance of spots found on the surface of refrigerated beef imported from Argentina. Amongst the variously colored patches one fungus, *Cladosporium herbarum*, was found to produce a black surface growth which might penetrate into the subcutaneous areolar tissue but very sparingly into the fat. Some 17 molds were also found to constitute other colored spots. None of these are pathogenic, and merely render the beef unattractive and so unsalable; they are found to grow throughout the civilized world; infection occurs before shipping and can only be prevented by treating the surfaces and wrapping cloths aseptically or antiseptically. Excision of the area stops further development of the fungus.—(C. N. F.)

NELSON, J. J. H., CAPT. INDIAN MED. SERVICE. **Some observations on the bacteriology of incinerator smoke and ash.** Jour. R. A. M. C., Vol. XX, No. 3, March, 1913.

From bacteriological experiments with *B. typhosus* and *B. coli* it was found that smoke and ashes blown from an incinerator are not sources of danger to the community, but merely a nuisance. "Incineration is well suited for disposing of infected stools and deleterious matter and when properly supervised can destroy all night soil and refuse with a minimum of labor and maximum of safety."—(C. N. F.)

SKELTON, D. S., CAPT. R. A. M. C., AND PARHAM, J. G., GOVT. BACTERIOLOGIST, ZANZIBAR. **Leprosy and the bedbug.** Jour. R. A. M. C., Vol. XX, No. 3, March, 1913.

With the belief that positive correlation found by Sandes and Long was founded upon "rather artificial conditions" the authors experimented "to ascertain if the ordinary bedbug taken directly from the bed of a leper did or did not harbor acid-fast bacilli." A negative answer is given and the belief expressed that the bedbug plays no "great part in the transmission of the disease in Zanzibar."—(C. N. F.)

HUNT, E. H., M. A., D. M., F. R. C. S. **The regulation of body temperature in extremes of dry heat.** Jour. Hygiene, Vol. XII, No. 4, December, 1912.

Observations in the excessively hot and dry climate of Deccan, India, where Hunt had been stationed for nine years, led him to undertake experiments in the physiological laboratory at Oxford to determine the capacity of the body to excrete perspiration to maintain normal body temperature in such a heated atmosphere that radiation

and conduction were no longer available to cool the body. Under such conditions, of course, heat was added to the body rather than lost. Evaporation was the only cooling agent available and in India it was observed that hard work in the sun was performed by hundreds of Europeans when the shade temperature was 109° F. and wet bulb 65° to 70° with improvement rather than detriment to health, provided only that sufficient water was ingested throughout the day, in no case being less than 3 gallons. This figure was found to agree closely with the amount theoretically computed as necessary for evaporation to keep the body temperature normal when ingesting food valued at 3,500 calories, secreting 1,500 c. c. of urine, to neutralize heat added to the body by surrounding objects and atmosphere and to allow for insufficient or wasted perspiration. This amount of water is required only in extreme heat and during great activity—1 gallon might have been sufficient without exercise inside a bungalow with same weather conditions.

In the laboratory it was found that after losing weight of 7¼ pounds in nine hours, during which no water was ingested except 8 ounces contained in food at lunch, perspiration was still active, the sodium chloride content continued normal, and the limits of sweating evidently had not been reached. The hemoglobin index of the blood was constant (average 104) showing that the loss of water was not ultimately derived from the blood. Engels is quoted to show that dog muscle takes up 67.89 per cent of an excess of water ingested and the skin 17.75 per cent; this indicates the capacity of tissues to store up water for emergency. It is of interest to note that the weight of dogs' kidneys increased by water 17.9 per cent, which even exceeds the muscles, which increased 17.1 per cent in weight.

Hunt's conclusions follow:

(1) Comfort and health can readily be maintained in dry heat where for long periods the air temperature is above that of the body.

(2) The amount of water absolutely required and actually consumed is very large, and this is accounted for by the necessity for neutralizing in some circumstances the whole heat of metabolism (requiring up to 6,000 c. c.) and in addition a variable but sometimes very large amount of heat added to the body by radiation and conduction.

A healthy man carries in his body a large reserve of water, this reserve being stored mainly in muscle and being so readily available that the percentage of water in the blood is not appreciably diminished even when several liters of water have been lost by sweating. If, however, it be drawn on extensively replacement seems to occupy many hours, and this delay is an important factor, forming a strong argument against any undue or needless use of the stored water owing to restriction of drinking.—(C. N. F.)

GIEMSA, G. **Experiences with spraying mosquitoes in fight against malaria and other mosquito-carried diseases.** Archiv. f. Schiffs. u Trop-Hyg. Bd. 17 Hft. 6, 1913.

The author in previous papers (idem, 1911, p. 533, and 1912, p. 565) has indicated, what he now presents in more detail, the necessity and means of adult mosquito extermination as an entity and addition to the usual larval insecticidal methods. The mosquito is essentially a "seasonal" insect, perishing about the end of the wet or during the dry season, a comparatively small portion surviving for propagation of the species in the next season. Steudel (idem, 1911, p. 121) indicates this as the time to make the attack. But the author believes that this should be undertaken as well during the rainy season, as it is at that time the anopheles is at its greatest height of activity and infectivity.

The almost impossibility of efficient destruction by fumigation of active adults under conditions of lack of screening as found in native huts has lead to the use of the spray. Since the previous communications Nocht, in Daressalam has had the opportunity to demonstrate successfully its utility.

Laboratory observations had shown the mosquito resistant to fluids aimed at entry through the alimentary tract, but quite easily the victim of these agents applied to the body, and finding entrance through the numerous minute openings over the thorax and abdomen.

The mixture finally settled upon by the author is as follows:

Tincture of pyrethrum (20 parts powd. pyreth. flowers and 100 parts of a mixture of 96 per cent denatured with 2.5 per cent methyl alcohol)........	580 g.
Potassium soap (if possible, odorless oil soap)................................	180 g.
Glycerin..	240 g.
	1,000 g.

Before use mix with 20 parts of water to thin.

For best results make a careful and methodical sweep over walls, ceiling, floor, etc., holding the nozzle of the apparatus about 18 inches from object, and end by spraying through the air to reach any insects that might be flying about. Proceed down wind when covering a community.

About 200 g. at a cost of 12 cents is needed per 100 cubic yards.

Cuts of three types of apparatus are shown, of the usual description.

The author concludes that the annihilation of infected anopheles is as important as destroying the malarial parasite in the human host, since the war against the larvæ in the water is carried always against uninfected individuals and hence only indirect.—(R. C. R.)

ZIEMANN, H. **Artificial house cooling in the Tropics.** Die Hygiene. Hft. 5, 1913.

Three different basic methods are available for the above purpose:

1. The use of spring or tap water through which to filter the warm air. This is practicable, but in the Tropics as a rule it will be found the water itself has too high a temperature.

2. Using the relative coolness of the night air in cooling the air of the day. A properly constructed dwelling with walls of nonconducting material, and inlets buried in the ground, water-cooled, is necessary in this method. Moreover, it will often be found that the night air is not sufficiently low to bring comfort.

3. The use of air-cooling machines. The State theater in Rio Janeiro, a cubic space of 90,000 m. is easily cooled from 26 to 27° C. down to 16°. Warm air is allowed to enter from the outside enough to bring up to a safer and more comfortable 20°. The author is astonished that this method is not more commonly used in private houses. He cites a house in Berlin containing an electrically-driven outfit of first cost about $1,800, and about 75 cents per day upkeep, less than the cost of ice for the refrigerators would have been. A reduction of only 4° from the outside temperature is needed to bring comfort. He recommends drying of the air with calcium chloride.

The installation of an ordinary refrigerator in the walls of a bed chamber, to be used as such during the daytime, but opened at night and air driven through by a small fan, is of great assistance and is inexpensive.—(R. C. R.)

ERLWEIN, G. **Portable ozone outfit for military use.** Gesundheit, No. 6, 1913.

The apparatus described follows in general lines that used at Mukden with good results during the Russo-Japanese War.

Two military carts, each carrying two men and drawn by one horse, or two horses in tandem if necessary, comprise the outfit.

One carries filter, ozone apparatus, sterilization chamber, and transformer, the other a 6-horsepower motor, mixer, and pumps for air and water. The sterilization chamber, which when in use stands to a height of 4½ feet and is about a foot through, folds down on top of cart. The raw water is pumped through the filters and sprayed into the sterilization chamber.

The weight of the motor cart is about 888 kg.; the sterilization cart, 1,295 kg. Both are decked in while under way, only the sterilization chamber and preliminary filters being apparent.

The cuts show a very sturdy and compact ensemble, apparently well suited for the field. They are now in use in the Chilean military establishment.—(R. C. R.)

TROPICAL MEDICINE.

E. R. STITT, medical inspector, United States Navy.

MONTEFUSCO, A., PROF., DIRECTOR OF THE HOSPITAL "COTUGNO," NAPLES. **Two cases of beriberi.** Ann. di Medicina Nav. e Col. Anno XIX, Jan., 1913, Vol. I, Fasc. I, p. 23.

The two cases of beriberi, studied and described by Montefusco in great detail, at the hospital Cotugno, had arrived from Massaua on board the *Piemonte*.

The first case was that of R. G., aged 49 years, native of Naples, chief machinist in the royal navy, admitted August 27, 1912. There were no signs of previous disease of any importance about the case; constitution very good; patient stated having noticed the first symptoms of the present trouble about 3 months before; great prostration, shooting pains in lower extremities, difficulty in walking, edema of legs, all coming on very rapidly during one night. There also had been slight fever for a few days, difficult breathing, with praecordial pain.

On admission, the man complained only of painful contractures of the lower limbs and pains about the knees while walking, burning sensations in the soles of the feet, great weakness, hardly permitting him to rise on his feet, walking difficult. Shows but slight edema about the malleoli; internal organs normal.

There is present a slight wasting of the muscles over the area of distribution of the peroneal nerve, which reacts indifferently to galvanic and faradic stimulation, as do also the muscles supplied by that nerve; knee reflexes slightly diminished on the right side, normal on the left; plantar and cremasteric reflexes sluggish on both sides, especially on the right. There is subnormal reaction to tactile and pain sensations in both lower extremities.

Blood examination:	
Hemoglobin	81.7
Red cells	5,148,000
Leucocytes	6,700
Ratio	1:768
Differential leucocyte count:	Per cent.
Polynuclear neutrophiles	69.8
Eosinophilic neutrophiles	3.0
Transitionals	7.9
Mononuclears	11.2
Small lymphocytes	2.6
Large lymphocytes	3.5
Myelocytes	2.0

No polychromasia, no poichilocytosis, no nucleated red cells.

Urine.—Quantity, about 1 liter in 24 hours; color, deep yellow, clear, reaction decidedly acid; specific gravity at 15° C., 1,024; albumen, 20 centigrams per 1,000; sugar absent; indican abundantly present; diazo reaction negative; urea, 19.48 per 1,000.

Microscopically urine shows the presence of a few leucocytes and epithelia of urinary passages; many crystals of oxalate of lime (15–20 in one field).

Treatment.—Substantial diet with 15 drops of Fowler's solution daily; followed by decided improvement after six days in the hospital. Pains and edema disappeared completely, general weakness subsided gradually. September 18 the man left the hospital completely cured.

The second case, although much more severe and further complicated by previous syphilis and malaria, likewise left the hospital completely cured after 12 days, under the same treatment.

The author attributes this rapid recovery to change of climate, good nutrition, while admitting that arsenic had its share in influencing the final outcome in the two cases.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

GENUARDI, G., DOTT., CAPITANO MEDICO NELLA REGIA MARINA. **Some cases of beriberi noted on board the "Calabria."** Ann. di Medicina Navale e Coloniale, Anno XIX, Jany., 1913, Vol. I, Fasc. I, p. 12.

Genuardi describes seven cases in detail. This small epidemic broke out while the *Calabria* lay in Assab, where she had arrived four months after leaving China (February, 1912). All seven cases were of the hydropic-cardio-vascular type. Although several cases had been noted to occur before on ships in the Red Sea coming directly from Italy, none had been noted up to that time in Assab, neither among the Huascars nor among the inhabitants of Massaua.

A type case.—S. F., fireman, aged 22 years, was admitted to the infirmary February 28 with edema and weakness in the legs, pain in thumbs and flexor muscles of the legs, palpitation, no rise in temperature. *On examination:* Extensive edema of lower extremities up to inguinal region, with anæsthesia over affected area, abdomen remaining sensitive. Knee reflexes exaggerated, plantar reflexes absent. Muscular power diminished in upper as well as lower limbs. Pulse slightly irregular, second heart sound accentuated. Periods of temporary improvement in all symptoms occurred every time the atmospheric humidity went down. Urine was of yellowish color, reduced to 750 c. c. in the 24 hours, acid in reaction, specific gravity 1,022, slightly albuminous. After 8 days it became clear, albumin disappeared, and quantity rose to 840 c. c. Occasionally patient suffered from cramps in flexor muscles of forearms; pains in flexor muscles of legs were continuous.

In a few cases which had been treated at the civil hospital at Massaua and which ended fatally, the patients suffered from edema and weakness of the lower extremities only a few days, and nothing apparently indicated so rapidly fatal a termination. A patient would complain of severe pain about the heart, had dyspnea, accompanied by nervous excitement, a few days after which vomiting set in, and death occurred shortly after.

Etiologically alimentation was eliminated. Genuardi considers as predisposing causes: (1) The sleeping on the upper deck in an atmosphere surcharged with humidity, and (2) the standing barefoot on the bridge wet with atmospheric moisture. An infectious germ, he

states, as yet unknown, might easily find entrance through minute wounds of the exposed parts, either directly or through insects. Certain it is, our author remarks, that no cases occurred among those on board whose feet had been properly protected by shoes and stockings.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

FISHER, W. **Experimental research into the rôle of glossina morsitans as carrier of sleeping sickness on Lake Victoria.** Arch. f. Schiffs u. Trop. Hygiene. Bd. 17, p. 73, 1913.

The author speaks of Taute's failure at Lake Victoria in 1909 in his efforts to transmit trypanosomiasis through *Glossina morsitans*, carrying his investigations with 376 insects to the forty-fifth day and with 50 to the sixty-fifth day. This negative result agreed with the belief of that day that failing *Glossina palpalis* the disease did not exist.

At the close of 1909 English observers in northeast Rhodesia and Nyassaland Protectorate demonstrated human trypanosomes in surroundings where only *Glossina morsitans* could come into consideration.

Then Taute at Lake Tanganyika easily demonstrated the transmission of *Trypanosoma gambiense* from infected to sound apes through *Glossina morsitans*, having a developmental stage in the latter of from 22 to 56 days. The lower altitude of Tanganyika than Victoria probably accounted for the facility of his success.

Fischer established himself again in Victoria at two hours' distance from Taute's former camp. An auxiliary camp four days' journey away in a region thick with *Glossina morsitans* supplied him with an abundance of the latter in the pupal stage.

The matured glossinæ were fed for 4 days on monkeys previously infected with 5 c. c. of blood from infected humans. To prevent mechanical carrying over they were not fed on the fifth and sixth days, but from the seventh to the seventieth days placed with a series of sound animals, about 100 flies starting each experiment.

A series of tables follows.

In 2 of the 14 series success followed. In 1 case the infecting glossinæ became so between the twenty-second and twenty-fifth days, the second between the twenty-sixth and thirtieth days. Of 1,402 glossinæ, 3 became infected, 0.21 per cent, though transitional forms were found in intestinal contents of from 1.7 to 2.5 per cent. Taute found as high as 4 per cent infected.

The author also demonstrated in a short series the absence of hereditary transmission of the trypanosome in *Glossina morsitans*.—(R. C. RANSDELL, PASSED ASSISTANT SURGEON, U. S. NAVY.)

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Assmy, Dr., and Kyritz, Dr. **Salvarsan treatment of ulcerating processes caused by the Vincent symbiosis.** Archiv. f. Schiffs und Tropen Hygiene, Bd. 17, Heft. 7, 1913.

It is noted that tropical ulcers may originate from a slight wound of the skin or mucous membrane which becomes infected with the Vincent organisms or the fusiform bacillus and the delicate spirillum may invade an ulcer of syphilitic or yaws nature.

In connection with their results they note that Schüffner considered that salvarsan was only of value when tropical ulcers had as foundation a syphilitic or frambœsia origin.

The authors consider that tropical ulcer and gangrenous stomatitis are spirochætoses which can start as such or develop from some other type of ulceration. Warm weather favors an acute course, while with cooler temperature a subsidence of the process sets in. Tropical ulcer shows a malignant tendency only in the debilitated. Salvarsan appears to be a specific for the organism of Vincent.

Associated with the fusiform bacillus and the spirochæte they have found a plump spirillumlike bacillus which they consider the symbiotic element responsible for the liquefaction of the necrotic tissue.—(E. R. S.)

Vortisch, van Vloten, Dr. H. **Chinese splenomegaly.** Archiv. fur S. und Tropen Hygiene, Bund. 17, Heft. 7, 1913.

The author states that of 3,600 patients treated at his clinic, 70 were cases of splenomegaly. Of these enlarged spleens, 8 were incident to malaria, 2 to due kala-azar, 3 from infectious diseases, and 57 of unknown etiology. In China these cases of splenomegaly, at times associated with cirrhosis of the liver and ascites, are unusually common.

The therapeutic measures used gave little result. The author gives a table of conditions causing splenomegaly:

I. Acute splenic enlargements.
- (*a*) Acute infectious diseases, especially typhoid fever, but also sepsis, relapsing fever, typhus, and cholera.
- (*b*) Embolism.
- (*c*) Hemorrhages from injuries.
- (*d*) Splenic abscess, from ulcerative endocarditis, sepsis, dysentery, etc.

II. Chronic splenic enlargements.
- (*a*) Circulatory obstructions.
  - (1) Portal vein, as in cirrhosis and cancer.
  - (2) Obstruction of splenic vein.
  - (3) Heart disease.

(*b*) Blood diseases, as leukæmia, pseudoleukæmia and Banti's disease.
(*c*) Inflammations and new growths of the spleen.
(*d*) Chronic infectious diseases.
  (1) Cosmopolitan: Tuberculosis, syphilis, dysentery, echinococcus, family splenomegaly.
  (2) Tropical: Malaria, kala-azar, trypanosomiasis, Malta fever, ponos.—(E. R. S.)

JAMES, DR. W. M. **Etiology of relapse in malarial infections.** Journal of Infectious Diseases, May, 1913.

The explanations of cause of relapse as usually given fall under two heads: (1) A peculiar form of parasite, resistant to quinine and to the protective forces of the body, is developed. Under this head we have the parthenogenetic view of Schaudinn and others, and second, Mannaberg's idea of conjugating ring forms as supported by Ewing and Craig. (2) As a result of action of quinine or the natural protective forces of the body, nonsexual parasites continue to go through their normal life cycle, but in very small numbers. Under favorable conditions for the development of the parasite its schizogenous activity is renewed and we have a relapse. Bignami believes that the nonsexual parasites become immune to quinine as well as to the natural protective forces of the body.

James states that Fülleborn, who had seen Schaudinn's original preparations, considered those forms interpreted by Schaudinn to show parthenogenetic activity to be similar to types of parasites in James's preparations which James regarded as atypical developing parasites.

The author states that in stained specimens he has repeatedly seen the forms described by Craig as showing conjugation, but when he attempted to find these in fresh specimens immediately afterward he only observed different aspects of multiple infection of the erythrocytes.

It is considered that the acceptation of the hypothesis that the asexual cycle alone causes relapses will explain all the factors concerned in the etiology of relapse. Certain practical considerations brought out in this paper are, (1) as quinine given by the mouth often fails to eradicate the schizonts in the bone marrow and spleen, and (2) the acquiring of immunity to the drug on the part of the parasites if only small doses of quinine are given at the onset, that we should give 45 grains per day, in doses of 15 grains, for 10 days. He states that this method has practically eradicated recurrent malaria among the Americans.

In one part of the article reference is made to the administration of 1.3 grams of the bihydrochloride of quinine and urea intravenously each day for three days; then 2 grams every other day for a week; and then the latter dose every third day for another week. The drug was given in 200 c. c. of normal salt solution. Dr. James states: "As far as I can determine cases that relapse after intravenous doses of quinine are those in which small doses have been given or that have been treated with quinine by mouth previously." Sufficient quinine given by mouth, except in very severe cases, will rapidly kill the parasites in the peripheral blood, but does not always get rid of those in the internal circulation.

NOTE BY E. R. S.—Bacelli's method of giving quinine intravenously in a concentration of 1 to 10 is considered by many authorities as attended with danger to the patient.—(E. R. S.)

DUVAL, C. W., AND HARRIS, W. H., DRS. **Further studies upon the leprosy bacillus. Its cultivation and differentiation from other acid-fast species.** Journal of Medical Research, May, 1913.

The authors make the statement that the claims of Levy, Kedrowski, Rost, and Bayon are for organisms now distinctly acid fast, though when first isolated they were described as nonacid-fast streptothrices. Duval and Harris consider (1) that many of the cultures which have been grown from the leprous lesion and regarded as the cause of the disease are varieties of one or more species, and probably bear no etiological relationship to leprosy, and (2) that the specific organism is an acid-fast one *in vitro,* analogous to the tubercle organism, and its initial cultivation outside of the host is accomplished with a medium containing the dissociate products of animal protein.

They state that *B. leprae* shows an extremely slow growth, even under most favorable artificial conditions, requiring from 8 to 10 weeks to attain a maximum growth, at which time this growth is comparable in amount to a growth of *B. influenzae.* The best method for original cultures is to transfer bits of leprous tissue to agar slants and then inoculate with some proteolytic nonspore-bearing bacillus, which digests the protein sufficiently in about two weeks to enable the leprosy organisms to start to multiply. The medium should be alkaline.

The hydrolizing organism is subsequently killed by a temperature of 60° C. for 30 minutes, this process not affecting the leprosy bacillus.—(E. R. S.)

In the April number of the Journal of the London School of Tropical Medicine is a note that Dr. R. T. Leiper has proved that the carrier of *Filaria loa* is a Chrysops and that two species, *C. dimidiata*

and *C. silacea*, serve this purpose. In both cases the filarial embryos developed in the salivary glands of these biting flies.—(E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

A. B. CLIFFORD, passed assistant surgeon, and G. F. CLARK, passed assistant surgeon, United States Navy.

FIORITO, GIUSEPPE, DOTT., TENENTE MEDICO NELLA REGIA MARINA. OSPEDALE MIL. MARITTIMA DI PORTOVENERE. **The search for spirochaeta pallida in conjunctival secretions of syphilitics.** Ann. di Med. Nav. e Col. Anno XIX, Jan., 1913, Vol. I, Fasc. I, p. 41.

Since cases of syphilitic infection through handkerchiefs have been observed and reported repeatedly, the author proposed to himself the task of ascertaining how often lachrymal secretions might be the transmitters of the infectious agents, especially since it has become recognized that mucous syphilides greatly tend to spread the disease. If the spirochaete survives in the drinking cups for 30 minutes, if it lives for 24 hours in the secretions of specific lesions, if it resists drying for several weeks, why should it not retain its virulence in lachrymal secretions, providing specific lesions exist, either on the ocular or palpebral conjunctiva or when germs are carried into the conjunctival sac from lesions in the nose? These and many other questions are suggested by the author. Since scarcely any attention has so far been paid to this subject, the author proceeded to examine 38 cases of syphilis in different stages of the disease. In all but one case the results were negative. On account of the great scarcity of treponemata present (2 in 6 preparations), our author does not feel absolutely convinced, even as regards this one case, in spite of the fact that the staining reactions apparently leave no doubts as regards the nature of the spirochaete.

Fiorito's researches having been interrupted by his being ordered to sea, we are promised the result of further researches on the subject on his return to shore duty.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

NICOLLE, CHARLES, BLAIZOT, L., AND CONSEIL, E., DRS. **Method of transmission of relapsing fever by lice.** Annals of Pasteur Institute. March, 1913.

The authors state that relapsing fever of Tunis, like typhus fever, is transmitted by lice and that these two diseases can be termed the diseases of the louse.

They made 15 experiments upon monkeys, allowing lice which had been fed on patients with relapsing fever and infected animals to feed upon these monkeys, but invariably with negative results. They found that when lice, either *P. vestimenti* or *P. capitis*, fed on infected animals that the spirochaetes rapidly disappeared, but reappeared on the eighth day and were to be found for 12 days

exclusively in the lacunar cavity. They could not be found in the alimentary tract or the feces of the lice. It is by the crushing of these infected lice and the transportation of the spirochaetes to an abrasion of the skin produced by scratching or to the conjunctiva that infection occurs. The infection seems to be transmitted by heredity, so that it is through the louse that the virus is afforded an existence in nature.

The tick which transmits South African relapsing fever, *Ornithodoros savignyi*, does not seem to transmit the relapsing fever of Tunis.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

LANE, CLAYTON, MAJ., I. M. S. **Trichostrongylus colubriformis (Giles, 1892), a human parasite.** Indian Medical Gazette, April, 1913.

In this article, which is illustrated by drawings, the author seems to show rather conclusively that *Trichostrongylus instabilis* reported by Looss for man as well as sheep in Egypt and *Trichostrongylus colubriformis*, found by Giles in the intestines of sheep from Sanawar are identical. Maj. Lane compared specimens furnished him by Giles from his original material with fresh specimens collected by himself from the intestines of sheep at Sanawar and found them, as was to be expected, identical. In this comparison he noted that the number of bursal rays agreed with the number noted by Looss in *T. instabilis*, so that it was evident that Giles had omitted one ray from his drawing (five pairs of rays and an impaired median one).

If the evidence brought forward by Lane is accepted the name of the human species should be *Trichostrongylus colubriformis* instead of *T. instabilis*.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

DARLING, S. T. **A method of staining the capsule of the Pneumococcus.** Proceedings of the Canal Zone Medical Association, Vol. IV, Part II.

1. Make thin films from cultures or exudates.
2. Flood film with glacial acetic acid for a few seconds and drain.
3. Wash with 1 per cent sod. bicarb. sol. to neutralize the acid.
4. Stain with dilute solution of gentian violet.
5. Wash off the gentian violet with an aqueous solution of eosin.
6. Wash off the eosin with Fehling's cupric sulphate solution and mount and examine in this fluid.

The capsules stain purplish pink, and are demonstrable in pneumococcic exudates, and in both young and old cultures.—(G. B. CROW, PASSED ASSISTANT SURGEON, U. S. NAVY.)

DRAPER, GEORGE, M. D., AND HANFORD, JOHN M., M. D. **Experiments in the transmission of scarlet fever to the lower monkeys.** Journal Experimental Medicine, Vol. XVII, No. 5, May 1, 1913.

The authors were led to a detailed study of the experimental production of scarlet fever in the monkey, partly because of the discordant statements in the literature on the subject.

The etiology of scarlet fever is still unestablished and there exists as yet no specific mode of treatment.

It is uncertain whether a streptococcus bears a direct or only an indirect relation to the disease, although it is known to be active in causing secondary or concomitant infections, either septicemic or suppurative in nature. Whatever the causative agent may be, there is no doubt of the inoculability of scarlet fever upon healthy human beings. The view is now generally accepted that the virus is contained in the secretion of the mucous membrane of the nose and throat.

The results with animals are less convincing. The ordinary laboratory animals appear to be wholly refractory to inoculation with materials carrying the virus. The question turns upon the susceptibility to inoculation of monkeys, both higher and lower.

The authors review the work of Grünbaum, Landsteiner, Cantacuzene, and Bernhardt and state that the symptoms described by these writers as evidence of scarlet fever in the monkey are not convincing.

The authors used three classes of material derived from patients in the early stages of scarlet fever: (1) Artificially sterilized, (2) fresh unsterile, (3) fresh sterile.

The artificially sterilized material consisted of sputum treated with carbolic acid, so that the mixture contained 0.5 per cent of the disinfectant. After 24 to 36 hours in the thermostat cultures were sterile. This procedure has been shown by Flexner to destroy the bacteria contaminating poliomyelitic virus, without injuring the virus. Monkeys are so resistant to infection by microorganisms from the nasopharyngeal secretions of human beings that the carbolized material was abandoned and fresh material used.

The fresh unsterile material consisted of (*a*) whole sputum shaken up with enough salt solution to render it evenly emulsified, (*b*) tongue and throat scrapings similarly shaken; (*c*) absorbent cotton tampons from the nasopharynx, (*d*) finely chopped tonsils, (*e*) washings from extirpated tonsils, (*f*) discharge from ear. This unsterile material was injected subcutaneously, submucously, and intraperitoneally without serious effect.

• The third class of scarlatinous material was composed of (*a*) urine obtained under sterile precautions and found sterile by culture, (*b*)

whole blood, (*c*) defibrinated blood, (*d*) sputum filtrate (Berkefeld), (*e*) filtrates of broth cultures of streptococcus from scarlatinous throats, (*f*) blood from scarlet-fever cases mixed with ascitic broth and incubated at 37° C.

The inoculated animals developed no symptoms and the following conclusions were reached: (1) The reported successful transfer of scarlet fever to both higher and lower monkeys is not definitely established. (2) In the course of the experiments here reported the infectious agent can be assumed to have been carried over to the monkeys. The failure to cause infection probably proceeds from the insusceptibility of the monkeys employed or to the manner of introducing the agent. (3) The temperature curve and leucocyte count of monkeys are unsatisfactory criteria for the diagnosis of disease in those animals. (4) Monkeys frequently have blotchy, erythematous eruptions on the face and neck, and almost always a branlike desquamation. (5) Monkeys are highly resistant to infection with microorganisms from human beings.—(A. B. C.)

HANNA, W., M. A., M. D., D. P. H. **Studies in smallpox and vaccination.** Editorial review, Lancet, May 3, 1913.

The studies were founded on carefully kept records in 1,100 cases of smallpox occurring in the Liverpool smallpox hospitals during the epidemic of 1902–3 and subsequently.

As regards case mortality at all ages, that of the natural disease—i. e., in the unvaccinated, which ranges approximately 25 to 40 per cent—was reduced by the power of vaccination to about 3 per cent in those who had been well vaccinated.

In the unvaccinated those at the extremes of life suffer most. In the previously vaccinated no case occurred in children under 3 years of age and no deaths under 20 years, but as age advances the protective power of vaccination against death from smallpox and its power of modifying the severity of the disease are gradually lessened. The duration of protection from attack by smallpox is much shorter than the duration of its power of modifying the disease.

Vaccination may "take" and pass through a typical course when performed at any time between exposure to smallpox infection and the appearance of the rash if smallpox develops.

During the first three days the degree of such protection is very high. The course of the disease in those vaccinated for the first time, just prior to contracting smallpox, was extremely mild.

Although the data are small, he is inclined to believe that the disease is modified, even in those vaccinated for the first time, after the onset of smallpox.—(G. F. C.)

COLES, ALFRED C., M. D. **Protozoal-like structures in the blood in a case of blackwater fever.** Lancet, May 3, 1913.

Coles reports a case occurring in a man who had resided in Rhodesia for four years and had developed the condition within a few days after his return to England.

The patient died on the sixth day of illness. No leucocyte counts or red cell counts were made, but differential leucocyte counts showed a reduction of polymorphonuclears from 74 to 47 per cent. One hemoglobin estimation on the last day was 14 per cent. Repeated examinations for parasites were negative.

On the fourth day of the fever and afterwards a few peculiar bodies were observed. In size they were between red cells and polymorphonuclears. The cytoplasm stained pale blue to bluish-red. They contained no nuclei but numerous small round or oval dots, showing chromatin staining.

Coles states that he does not consider the bodies to have been derived from the red cells or leucocytes. He suggests the possibility that such bodies may be found in internal organs and only appear toward the termination of the disease. He recommends that lymphatic glands be punctured and search made in the fluid during life, and after death that smears be made from the spleen, liver, bone marrow, and lymphatic glands.—(G. F. C.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, passed assistant surgeon, and O. G. RUGE, chief pharmacist, United States Navy.

TIBERIO, VINCENZO, DOTT., CAPITANO MEDICO, REGIA MARINA. **On a new test for indican in the urine.** Annali di Medicina Navale e Col. Anno XIX, Vol. I, Fasc. I, p. 5.

Most all our present tests for indican in the urine are modifications of the method of Jaffe, based upon the decomposition of potassium indoxylsulphate with some strong acid, the oxidation of indoxyl to indigotine, and the extraction of the latter by some suitable solvent.

In order to determine the presence of potassium indoxylsulphate in the urine, Tiberio proceeds as follows: In case the urine is turbid, containing muco-pus or biliary pigments, it is clarified through the addition of a few cubic centimeters of a 5 per cent solution of neutral lead acetate and filtered. About 5 c. c. of the clear urine are mixed in a test tube with an equal quantity of concentrated hydrochloric acid. To the mixture are added 1 or 2 centigrams of perborate of soda in substance. Small gas bubbles are at once seen covering this substance. Now close the test tube with the finger and turn the tube upside down a few times. If indican is present in abundance the

urine will take on a deep blue-purple color. Add 1 c. c. of chloroform—which takes up the indoxyl—and allow the blue solution of chloroform to settle at the bottom of the test tube by standing. If shaking is continued a couple of minutes, most of the indoxyl will have passed into the chloroform. The portion above the level of the chloroform continues to show a rose color with a slight tinge into violet, a coloration due to scatoxyl, which is insoluble in chloroform. Admitting with Brieger that most of the indol is formed during putrefaction in the large intestine, and that scatol is formed in the small intestine, an approximate idea may thus be formed of the intensity of the processes of putrefaction going on in either, by the intensity of the color reaction shown in the chloroform solution on the one hand and that of the supernatant liquid on the other. The test is sufficiently accurate for all clinical purposes.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.).

JONA, J. L. **Adrenalin in emergency treatment of noncorrosive poisoning.** Brit. Med. Journ., February 8, 1913.

Early administration of 1 to 10,000 solution of adrenalin by mouth causes immediate and marked constriction of the vessels of the mucosa of the stomach and the upper part of the duodenum. This vasoconstriction materially lessens the rate of absorption of poisons and leaves more time for institution of measures of elimination or neutralization. The conclusions are based on experiments with rabbits, using potassium cyanide, strychnine, and aconite. Three c. c. of the 1 to 10,000 adrenalin solution produced sufficient vasoconstriction in the rabbit and, basing the calculations on the relative areas of the stomachs, he suggests the use of 90 c. c. of the solution in man.

The adrenalin converts the stomach into a nonabsorbing bag.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

BOGDÓUDY, S. V. **Determination of pepsin activity.** Zeit. Physiol. Chem., 1913, 84, 18–29.

Sixty c. c. of a casein solution prepared by mixing 17.5 gms. of casein with 200 to 300 c. c. of water, adding 27.5 c. c. $\frac{n}{1}$ HCl, diluting to 500 c. c., and heating to 40° C. to obtain perfect solution, are mixed with the pepsin, heated to 40° C. for a known time, and the unchanged casein precipitated by adding 30 c. c. of a reagent containing 150 gms. sodium sulphate, 50 gms. magnesium sulphate and 100 c. c. 90 per cent alcohol per liter. The mixture is made up to

100 c. c. with water, filtered, and the rotary power of the filtrate measured. This rotary power, though admitted to be not exactly proportional to is yet a measure of the activity of the pepsin, and the results obtained agree with those given by known methods.—(E. W. B.)

JOLLES, ADOLF. **A delicate test for the detection of albumin in urine.** Zeitsch. Physiol. Chem., 1912, 81, 205–206. Compare A., 1896, ii, 344.

The reagent is composed of mercuric chloride 10 parts, citric acid 20 parts, sodium chlorate 20 parts, water 500 parts. Five c. c. of the filtered urine are added to each of the three test tubes. To (1) and (2) 1 c. c. of 30 per cent acetic acid is added, 5 c. c. of the reagent is put in (1), and the other tubes are filled with water to the same level. The tubes are observed against a black background (3), being placed in the middle. The reaction is sensitive to 1 part of albumin in 120,000.—(E. W. B.)

BUCHTALA, HANS. **Behavior of mercury in the human and animal organism on the usual therapeutic method of application. New method for the estimation of mercury in the urine and in the tissues.** Zeitsch. Physiol. Chem., 1913, 83, 249–303.

Contains a critical summary of the methods of estimating urine, with a full bibliography. A method is described of destroying the urine by evaporating with potassium chlorate and hydrochloric acid and so converting the mercury into chloride. The solution is filtered and electrolyzed in a special apparatus between a cathode of gold foil and a gas carbon anode. The mercury is deposited on the gold, which is rinsed, dried and weighed, and heated to volatilize the mercury, the weight of which is determined by difference. The skin is equally able to take up volatile and nonvolatile mercury ointments; the ointment base has an accelerating influence on the resorption. The separation of mercury in the urine has been studied after internal administration and also after intramuscular and intravenal injection of mercury salts. In the latter case the separation is materially faster. The addition of potassium iodide to the mercury salt is shown to diminish the excretion of the mercury.—(E. W. B.)

BANG, E. **Method of estimating sugar.** Biochem. Zeit., 1913, 49, 1–19.

A copper solution is prepared by dissolving 160 gms. potassium bicarbonate, 100 gms. potassium carbonate, and 66 gms. potassium chloride in about 700 c. c. water, adding 4.4 gms. copper sulphate and diluting to 1 liter. Of this solution 300 c. c. are diluted with a saturated potassium chloride solution to 1 liter. In preparing these

solutions it is necessary to avoid vigorous shaking, as this causes the absorption of too much air. Forty-five c. c. of this solution are added to the sugar solution contained in a 100 c. c. Jena flask, to the neck of which is attached a thick rubber tube. The mixture is boiled 3 minutes, the flask then closed by means of a strong pinchcock, and immediately after closing removed from the flame and cooled in a stream of water. It is essential to avoid access of air during cooling to prevent reoxidation of reduced copper. When cold the flask is opened, starch solution added, and the reduced copper estimated by titration with standard iodine of convenient strength $\left(\frac{n}{10} \text{ to } \frac{n}{100}\right)$. Tables are given showing the quantities of $\frac{n}{100}$, $\frac{n}{25}$, and $\frac{n}{10}$ iodine, which correspond with quantities of 1 to 10 mgs. dextrose. It is claimed that the new copper solution is superior to the older ones proposed by the author in not being reduced so readily by substances other than sugar, which is of special advantage in determining sugar in blood and urine.—(E. W. B.)

TRED, E. B. **Investigations on the quantitative reduction of methylene blue by milk bacteria and the use of this dye for determining the condition of milk.** Zentralb. f. Bakter. u. Parasitenk., 1912, 35, II, 391.

The flora of milk is especially rich in microorganisms capable of reducing methylene blue. Of 22 species, 21 are able to effect this reduction, which takes place more rapidly in milk than in bouillon; the velocity is a linear function of the temperature, increasing with rise of temperature up to 37° C. The reduction in a culture inoculated into a new medium is directly proportional to the growth of the bacteria, and ceases with the exhaustion of the medium. Each species of bacteria has a different coefficient of reduction of methylene blue. Multiplication of organisms and reduction of dye-stuff give, for all species, curves of the same general form; their courses are therefore parallel. Peroxydase exists ready formed in milk; it is not a product of the growth of the bacteria, as are catalase and reductase. The reduction of Schardinger's reagent is due to aldehydecatalase, the enzyme of which promotes the reduction of methylene blue by formaldehyde. The reduction of methylene blue in the absence of formaldehyde is complicated; it is probable that the intra-cellular and extra-cellular products take part in it. The reduction tests furnish an easy method for the approximate determination of the number of bacteria in milk. Thus, if reduction is effected in 15 minutes, the milk contains 15 to 50 million per c. c.; if 7 or more hours are required, less than 1 million.—(E. W. B.)

EYE, EAR, NOSE, AND THROAT.

G. B. Trible, passed assistant surgeon, United States Navy.

Birch-Hirschfeld. **Blinding by sunlight.** Trans. Ophth. Soc. of Heidelberg, 1912. Abstracted from review in Arch. Ophth. Vol. xlii No. 3.

In 34 cases, 50 eyes, injured by looking at an eclipse of the sun, Birch-Hirschfeld found a normal fundus in but 4; in 19 there was an enlargement, obscuration, and irregular form of the foveal reflex, in 4 with a dark brownish red discoloration in the vicinity. In 16 cases an irregular pigmentation of the macula developed with punctate gray spots. No direct connection between the ophthalmoscopic condition and the functional disturbance was present. Thirty-one of the 50 eyes had a central and 19 a paracentral positive scotoma, which was always positive at first but later changed to relative in many cases.

The author is of the opinion that the pathologic lesions are destruction of the outer segments of the sensory epithelium, of the outer granules, the pigment epithelium, hyperaemia of the choroid, transudation into the outer retinal layers while the inner layers are intact. Exclusion of the ultraviolet and ultrared rays did not prevent the onset of typical lesions. The luminous rays are concluded to be the active agent in the production of the lesions, and protective glasses should be worn in viewing an eclipse of the sun, as they weaken the luminous rays so that no blinding afterwards ensues.—(G. B. T.)

Darieux. **Enucleation in the treatment of panophthalmitis.** Ann. d'oculistique cxlvii.

This operation is preferable in all cases in which the infection entered through a perforating wound, whether a foreign body is present or not. In metastatic panophthalmitis the prognosis is poor though enucleation makes it no worse, for it depends upon the severity of the general infection.—(G. B. T.)

Brav, Aaron. **Ocular headache.** N. Y. Med. Jour., vol. 97, No. 6.

According to this author some form of eye strain or error of refraction is responsible for about 70 per cent of cases. He considers that headache in an otherwise healthy individual, and not associated with any of the acute infectious diseases, is with rare exception caused by some error of refraction or muscular unbalance.

After the correction of the refractive error the muscular disturbances must in some cases be treated by prism exercises and hygienic and dietetic measures. An occasional tonic as well may be needed to restore the patient to health.—(G. B. T.)

DE OBARRIO, P. **On the tolerance of the vitreous to dislocated lenses as an index to reclination in given cases.** Journal of Ophthalmology & Oto-Laryngology, vol. 7, No. 5.

The author reports a number of cases of traumatic cataracts which had been dislocated into the vitreous. These cases uniformly showed great tolerance to the presence of the cataractous lens, and, based on his experience with a number of such cases, the author advocates the practice of reclination in the treatment of tremulous cataracts. In this procedure the dangers of extraction are obviated.—(G. B. T.)

MOURE, E. J. **Treatment of nasal synechiæ with mica plates.** Ann. Otology, Rhinology & Laryngology, Vol. XXI, No. 4.

Following turbinate operations, whether with the galvanocautery or by resection of the mucous membrane, there is a variable reaction. In some cases the wound will heal under a pellicle or slough, and in other cases there is marked swelling, a raw granulating surface which remains in contact with the septum, and in the end, in spite of care, will be followed by adhesions. Various methods of interposing tampons of cotton or gauze, pieces of cardboard, and celluloid leaves have been advised. The objection that these substances produced irritation and in some cases prevented drainage have always been found.

The author thinks that mica scales give the best results. These scales are flexible, can be secured as thin as tissue paper, and bear high temperatures without softening or breaking, so they can be readily sterilized. No interference with drainage is caused by their presence, and they can be easily introduced, curled up, through a nasal speculum. Their elasticity allows them to straighten out between the septum and the turbinates and to prevent adhesions.—(G. B. T.)

REPORTS AND LETTERS.

REPORT OF WORK DONE IN THE WARDS OF THE NAVAL HOSPITAL, NORFOLK, DURING THE YEAR 1912.[1]

By L. M. SCHMIDT, passed assistant surgeon, Unites States Navy.

MEDICAL WARDS.

There were 424 admissions during 1912, with 3 deaths, a mortality of less than 1 per cent. Of the 3 deaths, 2 were old cases of aortic regurgitation and 1 was tuberculous meningitis. All three diagnoses were confirmed by autopsy.

The 10 most common diseases, as represented by admissions, were chronic bronchitis, 31; malaria, 26; lobar pneumonia, 24; acute rheumatic fever, 24; insanity, 24; neurasthenia, 14; chronic gastritis, 13; epilepsy, 12; chronic nephritis, 11; acute pleurisy, 10.

The outcome of the 31 cases admitted as chronic bronchitis makes it appear that as a distinct entity this disease is too often diagnosed. In fact, it is believed to be rare when unassociated with tuberculosis. Of these 31 cases admitted, 17 had the diagnosis changed to tuberculosis of the lungs, and, of those sent back to duty with a symptomatic cure, several were afterwards admitted to the sick list as with tuberculosis.

During the latter part of the year all chest cases were radiographed and the cases of bronchitis, chronic, all showed evidence of glandular involvement at the root of the lung or scar tissue formation, which left little doubt that the condition was tuberculosis.

The 24 cases of lobar pneumonia recovered without complications. Because of the well-known tendency of pneumonia cases to injure themselves by leaving their beds, and even getting out of windows, a leg restraint was placed upon each case and left there until the fever dropped. The treatment of the first 21 cases was by elimination and careful nursing and, with the exception of calomel and salts, no drugs were used. The last three cases were treated with succinimid of mercury after the method originated by Surg. B. L. Wright, United States Navy. The results were spectacular and a brief abstract of these cases is submitted:

Case 1, T. E. G. Onset by chill, fever, and cough morning of December 2, 1912, and admitted to hospital that night. Examina-

[1] Abstract from the Annual Sanitary Report, Naval Hospital, Norfolk, Va., for the year 1912.

tion on admission: Temperature, 103; respiration, 36; pulse, 126. Consolidation right lower lobe. On December 3 diagnosis confirmed by three members of the staff. Patient injected at noon. The following morning temperature normal; respiration, 20; pulse, 118. No subsequent rise in temperature and patient made uneventful convalescence.

Case 2, A. A. Onset December 11, 1912, with chill, pain in chest, cough, and fever. Admitted to hospital December 12. Examination on admission: Temperature, 104; pulse, 126; respiration, 38. Consolidation right middle lobe and beginning consolidation of right lower lobe. On December 13 diagnosis confirmed by three members of staff and succinimid given. The following morning temperature normal; respiration, 22. Patient made uneventful convalescence, although sputum continued rusty and lung signs persisted for the usual time.

Case 3, E. A. R. Severe chill, with cough, December 10, 1912, followed by fever and pain in right side. Admitted to hospital December 11. Examination on admission: Beginning consolidation right apex; temperature, 104.2; pulse, 112; respiration, 32. Sputum, blood streaked. Delirious. Injected same day. The temperature came gradually to normal within 48 hours, the lung signs persisting for the usual time.

The splendid results obtained in the three cases above cited would seem to fully justify or, rather, demand the application of this method of treatment until a sufficient number of cases have accumulated upon which to base a definite opinion as to its efficacy.

Acute rheumatic fever was a matter for careful consideration because of its serious complications and crippling effects. Of the 24 cases, 12 were afterwards surveyed from the service for heart conditions. The majority of the cases at some time during the course developed heart murmurs, and in those in which no heart murmurs were heard a change in the quality of the heart tones from day to day indicated with great probability some endocardial change.

The chronic gastritis cases can be divided into two classes. Those under 30 years of age usually proved to be chronic disease of the appendix, and recovered after appendectomy. Those over 30 years of age most often proved to be gastric ulcer.

Five cases admitted as cholecystitis proved to be catarrhal jaundice or syphilis, and all recovered without operation.

In the dressing room of the medical ward an emergency package is kept for the purpose of performing prompt venesection in heart cases with sudden loss of compensation. This package contains sterile instruments, sutures, and dressings sealed in a glass jar.

EYE, EAR, NOSE, AND THROAT DEPARTMENT.

Two hundred and forty cases were admitted to the eye, ear, nose, and throat ward during the year. There were no deaths in this department. The 10 most frequent causes for admissions were the following: Otitis media, tonsillitis, hypertrophy of tonsils, deviation of nasal septum, conjunctivitis, iritis, gonorrheal conjunctivitis, chronic rhinitis, sinusitis, and pterygium.

There were 51 cases of otitis media, 44 of which were returned to duty. The remaining cases did not yield to local treatment and refused operation.

All tonsillitis cases were isolated, and smears and cultures were made. Among 44 cases admitted no case of diphtheria was found. The majority of these cases had tonsillectomy done after acute symptoms subsided. The operations done were enucleation and the punch operation. The enucleation was more frequently followed by severe hemorrhage than was the punch operation.

Eight cases of gonorrheal conjunctivitis were treated, and no eyes were lost or permanently injured.

One hundred and forty-eight operations were done in this department. In order of frequency, the most common operations were: Tonsillectomy, submucus resection, post-tonsillar abscess, adenoids, mastoid, pterygium, and frontal sinus.

One hundred and fifty-five cases were refracted. The great majority of these were out-patients, officers, and members of their families, and men from the station and ships. The most common errors were hyperopic astigmatism and hyperopia.

Preliminary to the administration of salvarsan, all patients were subjected to an examination of the eyes. This determined acuity of vision, with cause of defect if any existed, and the condition of the retina. Two hundred and twenty such examinations were made. This procedure eliminated complaints of the patients, that salvarsan injured the eyes, by calling attention to the defect prior to the administration.

REPORT OF RELIEF WORK IN TURKEY.[1]

By D. C. WALTON, assistant surgeon, United States Navy.

In November, 1912, following the retreat of the Turkish Army, an epidemic of cholera occurred in Constantinople. The usual prophylactic measures were taken and no cases occurred among the personnel.

Early in August, 1912, a violent earthquake occurred in Turkey, destroying most of the villages on the north shore of the Dardanelles

[1] Abstracted from Annual Sanitary Report of the U. S. S. *Scorpion* for the year 1912, received Feb. 3, 1913.

and Sea of Marmora. On August 14, 1912, having taken on medical supplies and comforts, the *Scorpion* went to the aid of the sufferers. The villages of Sar-Kioi, Myriophyto, Hora, Ganos, and Heraclitza on the coast, and three inland villages, were visited by Dr. Post, of Konia, Turkey, and myself, assisted by the hospital steward and a party from the ship, and the sick and wounded were tended. A feature of interest was the large number of fractures of the pelvis encountered. After leaving supplies at the various villages the remainder of the stores was turned over to the Turkish Red Crescent expedition, which arrived later.

After the breaking out of war between Turkey and the Balkan States, Maj. Clyde Ford, Medical Corps, United States Army, established a branch of the American Red Cross in the Tash Kishla Barracks, Pera, with two wards and an operating room. Through his courtesy I was allowed to work there, aided by the hospital steward, and saw a number of wounded. A great many of the wounds were from shrapnel and were received in the back while lying in the trenches. Very few of the bullet wounds showed a shattering effect, but the shrapnel caused great destruction of tissue. As most of the troops were in bad shape when wounded, owing to loss of sleep, long marches, and having gone without food for several days, a large number of the wounds failed to heal and were badly infected. The condition of the wounded on reaching Constantinople was terrible. From the beginning of the war the Turkish commissariat and medical departments were helpless and the men had marched and fought without food or rest for days; after being wounded they had made their own way without a dressing of any kind over their wounds to the railway, often 50 miles away.

Here the wound was given a hasty dab with iodine, the wounded men crowded in a box car and sent to Constantinople. In most instances the first dressing was done 5 to 8 days after injury. That as many survived as did is little short of marvelous. On the other hand, a large number of abdominal wounds recovered, owing to the fact that the intestinal tract was empty for some time before and after the receipt of the wounds. The transportation of the wounded failed completely, and it is doubtful if many of those unable to walk were brought back. It is more probable that the greater number of them fell into the hands of the Bulgarians. As a large number of the wounded were turned over to private hospitals and the foreign Red Cross units, there resulted a large loss of efficiency to the Turks, the return of the cured cases to the ranks being very much delayed. The disadvantage to a military force of turning over its wounded to civilians has probably not been better exemplified in recent years. I have seen healthy Turks, perfectly able and willing to return to the ranks, held in the hospital for two weeks, as there was no one to dis-

charge them. While admitting that from a humanitarian point of view the work of the volunteer units was splendid, it is my opinion that, when possible, patients should never be turned over to them, as the loss of their services at the front will be at least doubled.

NOTES ON SANITARY CONDITIONS ALONG THE YANGTZE RIVER.[1]

By R. H. Laning, assistant surgeon, United States Navy.

The cruising of this vessel in the past year has been confined to the Yangtze River up as far as Ichang and down as far as Shanghai.

The diseases prevalent among the natives and foreigners along the banks of the Yangtze, and hence those liable to be communicated to the men aboard ship differ with the season of the year, as do the causes conducive to ill health.

The hot season from July to the middle of September is perhaps the most unhealthful. In the first place the intense heat is debilitating, thus lessening the resistance to various diseases, especially water-borne diseases such as dysenteries of various kinds. The heat, moreover, favors the presence of large numbers of mosquitoes and other disease-carrying insects, as well as the proliferation in the water of various germs which cause intestinal disturbances. Venereal diseases are more prevalent during the summer, perhaps due to the lack of energy in supervision of brothels on the part of the civil authorities ashore, as well as the general apathy on the part of the women and their consorts.

Heat stroke and heat prostration are fairly common, particularly in the large centers, such as Shanghai. No cases have occurred, as far as my knowledge goes, among the Navy personnel, but several cases of death from heat stroke have occurred among the British naval personnel. Several British naval surgeons have remarked to me that this seemed rather strange, since the American sailors never wear anything on their heads but the regulation white cap, whereas the British wear straw hats. It is to be remarked, however, that the British sailor, as a rule, wears the same thick woolen underwear during the summer that he wears during the winter.

A summer diarrhea, called by some the "Yangtze diarrhea," is a very common ailment. The typical form is a diarrhea of from 10 to 15 movements a day, associated with a moderate fever and lasting three or four days. This ailment readily yields to purges followed by intestinal astringents. The exact origin of this type of disorder has not been discovered to my knowledge; some physicians claiming that it is due to chilling of the abdomen during the night after a hot day, others claiming that it comes from the drinking water.

[1] Abstract from Annual Sanitary Report, U. S. S. *Quiros*, 1912.

The more severe dysenteries are quite frequently seen, i. e., the bacillary and amebic types, but more especially the latter. There was one case of amebic dysentery aboard this ship which was traced to greens eaten ashore. The case readily yielded to treatment with ipecac.

Malaria is quite common, particularly during the latter part of July and August. Tertian, quartan, and estivo-autumnal types are seen, but the tertian and estivo-autumnal types are the most common, the estivo-autumnal type being quite common in the neighborhood of Kiukiang, sometimes yielding only to intraspinal injections of quinine.

The municipal doctor at Kiukiang describes a peculiar disease occurring during the summer among the Chinese, characterized by a petechial rash more or less distributed over the trunk and limbs, great prostration, anemia, tendency to hemorrhages, and moderate temperature lasting from three to four weeks. The doctor says he discovered estivo-autumnal crescents in one case, but he thinks it was typhus fever, although he says the symptomatology, as well as the mortality rate differ from the usual cases. These patients are generally covered with insect bites.

During the months of July, August, and part of September, cholera and scarlet fever claimed quite a number of victims in the lower reaches of the river, especially from Kiukiang to Shanghai. Lectures were given to the crew on the nature of these diseases and men were instructed to eat nothing ashore and to drink nothing but bottled beer and Tansan water. Night liberties were interdicted.

The municipal health officer of Shanghai claimed that the epidemic which occurred last summer was not Asiatic cholera. He said that in repeated laboratory examinations he had not been able to find the *Spirillum cholerae asiaticae*, but had found large numbers of a bacillus belonging to the Gärtner group. He claimed that the mortality rate of this epidemic was only 10 per cent, while that of Asiatic cholera must be higher. The treatment generally given for this disease during the epidemic was saline venous transfusion and pituitary extract by mouth.

Infection with *Trichuris trichiura*, *Ascaris lumbricoides*, and *Agchylostoma duodenale* is quite common, particularly among the natives.

During the spring and autumn, and especially the latter, perhaps the most talked of disease among foreigners is infection with *Schistosomum japonicum*. This disease is contracted mostly by huntsmen and bathers. Several British officers have been invalided home on account of it, and quite a number of civilians in Hankow have contracted the disease. Various theories are entertained by physicians ashore as to the mode of entrance of this parasite into the human

body, some claiming that it makes its entrance either through an abrasion or through the anus. It is claimed that if the skin is covered with a fairly thick-meshed material the parasite can not infect. It is perhaps a notable fact that in the cases of the British officers above mentioned two officers practically always went shooting together, and that while one contracted the disease the other did not. They were apparently equally exposed, except that the victims in each case wore lighter clothing about the lower extremities. Dr. Lambert, of Kiukiang, has published some very good articles on the disease. (Trans. Soc. Trop. Med. and Hyg., 1910, Vol. III, No. 6; ibid., 1911, Vol. V, No. 1.)

I have been out shooting quite frequently with a number of the men, and have done a lot of wading in marshes and streams. I never remember, however, of having waded in water deeper than the crotch, whereas those infected British officers say they waded sometimes up to their necks. None of us as yet has contracted the disease. It is a routine measure aboard this ship for men on their return from expeditions necessitating wading in water to wash their lower extremities in strong formalin solution.

The disease is characterized by stools capped with blood and mucus and attended with painful straining, a temperature resembling typhoid fever, an urticarial rash over the body not very marked, and an enlargement of the spleen in the later stages. The mortality percentage is stated variously by the physicians ashore, it generally being given in the neighborhood of 50 per cent. From the few cases I have seen and followed and heard of, this seems altogether too high a percentage.

Particularly during the spring months there is quite prevalent a disease which is called here typhoid fever. I am told that sometimes the Widal reaction is present and at other times absent. The mortality rate is not as high and the frequency of complications is not as marked as in the typhoid fever of the United States. The symptoms are practically the same as those of the typhoid fever there, except that in practically every case there is a sudden drop of temperature in the second week, followed by an almost immediate rise and a continuation of the course of the disease to a natural fall by lysis.

During the winter months the diseases prevalent on the shores of the Yangtze are practically those at home, viz, coryza, bronchitis, etc.

THE YANGTZE VALLEY.[1]

By J. J. O'Malley, assistant surgeon, United States Navy.

The Yangtze Kiang River is the great central waterway of China, running irregularly from west to east, with many marked bendings and windings, and draining by many small streams a basin which embraces the following Provinces: Anhwei, Hunan, Hupeh, Kiangsi, Kiangsu, and Szechwan.

This basin is the richest and most populous section of China, having an estimated population of 190,000,000 and 570,000 square miles of territory, or 332 inhabitants per square mile. The greater part of this land is under cultivation, and there are considerable deposits of minerals in the mountainous section; gold, silver, copper, antimony, coal, and iron have been found, though at the present time there are only a few iron, coal, and antimony mines in operation.

The topography of the basin consists of lowlands adjacent to the river bed and extending back to the foothills, where the land rises into a low, mountainous, undulating section. These lowlands show extensive cultivation. During the season of high water the lowlands in many places are inundated, with the houses under water, and for miles only the roofs and tops of trees are visible. In some sections the water extends over 20 miles. The inhabitants during this season are crowded into the cities or camped on the hills or living in small junks or boats. This inundation, with destruction of crops, causes considerable suffering and poverty. No matter how many times a Chinaman is flooded out of his house and farm, he shows his characteristic perseverance and comes back when the river lowers, starting again on the same land.

The hilly section and tableland are studded with small lakes and rivers. The latter are navigable for small boats or junks and serve the purpose of transportation to the Yangtze, while the many collections of water are used extensively for irrigation and make the land very productive.

There are many villages and towns along the river, and a few good-sized cities. The latter are usually characterized by closely built two-story houses, narrow, dirty, winding streets, congested traffic, an enormous population for the area, no provision for sewerage or water supply, excepting in the city of Hankow, and this only recent. Garbage and night soil are carried, deposited, or thrown in the streets and alleys, and these conditions occasion a succession of sights and smells appalling to the visitor and beyond the imagination of the uninitiated, and all this is surrounded by a wall. With the exception of the wall, the same condition exists in the villages and towns.

[1] Abstracted from Annual Sanitary Report of the U. S. S. *Elcano* for 1912, received Jan. 9, 1913.

The large cities are usually treaty ports, and have a small area set off outside the wall as a concession, in which the streets are wide and clean and the houses well built and of foreign architecture. The water is obtained from the river (in a few places from wells), and this is filtered and boiled before using. The sewage is carried away. The water supply in the Chinese cities is always obtained from the river, coolies continually carrying it from the river in buckets back into the city, where it is usually boiled before using. The night soil and garbage are collected in buckets by coolies and carried back into the farming sections, where they are deposited in large containers and used for fertilization.

The climate is characterized by a very hot summer, a cold, miserable winter, and a mild fall and spring. During the summer months the temperature averages between 90° and 105°, with a high relative humidity, making it very oppressive and, with the surroundings, unhealthy. Most of the foreigners spend all the summer and especially the months of July, August, and September, in the hills at Kuling or some other resort. In some sections, as around Hankow, the nights maintain the same high temperature as the day, or higher, and with the many varieties of bugs, flies, and mosquitoes that abound living here during this season is most uncomfortable.

During the winter the thermometer rarely goes to zero and snow is seldom seen, but there is considerable rain and a cold damp wind is usually present. This is more marked during January, February, and March. Fall and spring are mild and pleasant, with comfortable days and cool nights.

There is hardly any disease that is not prevalent in the Yangtze Valley. Cholera is present every summer. No epidemic has occurred recently, but sporadic cases are always present during June, July, August, and September. There is always the grave danger of an epidemic from the very unhealthy surroundings and the method of living among the Chinese. Dysentery, both amœbic and bacillary, is common. Intestinal parasitic diseases are so common that it is said there is hardly a Chinaman along the river who does not possess some variety.

The most interesting parasitic disease seen here is schistosomiasis (japonicum); this disease is found in almost every section where microscopic examination of stools is made. In the rice-growing country around Wuhu, Kiukiang, and Yochow it is very common among the coolies who work in the rice fields, due to the custom of using night soil for fertilizing. Rice being planted and cultivated in fields covered with water and the night soil mixed with the water in which the coolie works, sometimes in water to his knees, permits the dissemination of the disease in this class, either through the skin or through the alimentary canal. Schistosomiasis is seldom seen in

foreigners; only four cases have been reported, three in Hankow and one in Yochow. It is well recognized among the foreigners, and when out on hunting trips in the rice fields they equip themselves with stout shoes and tight leather or cloth puttees. This seems to protect them. Dogs are frequently attacked, particularly the dogs used for hunting. The disease is not usually seen until the stages of weakness, ascites, and cachexia intervene, and then the natives apply to a foreign hospital for treatment. During the winter months many cases are seen in the hospitals at Wuhu, Kiukiang, and Yochow. The cold weather, their homeless state, and their inability to earn a living during this season drive the Chinese to find a place where they can winter and when the summer comes they go out again, disseminating the disease and engaging in such operations as they are able to perform. This is their round of life until they die. The disease is seen at all ages, in both sexes, and almost entirely among the coolies engaged in rice cultivation.

Briefly, the symptoms of the disease are extensive enlargement and pains in the liver and spleen, irregular diarrhea, sometimes with blood and mucus in stools; ascites, which increases and decreases, but gradually gets worse and in some cases is enormous; irregular fever, with gradually increasing weakness and cachexia. The condition lasts from two to five years and always terminates in death from the cachexia or heart failure or an intercurrent disease, either pneumonia or tuberculosis. The diagnosis is easily made from the enlargement of liver and spleen, the ascites, weakness, cachexia, and finding the eggs in the stool; the latter can be easily mistaken for the eggs of *Agchylostoma duodenale.*

Tuberculosis, malaria, and venereal diseases are about the most prevalent diseases in this section. Typhoid fever is seen during the summer and fall, but is usually of a very mild type, suggesting paratyphoid. Smallpox and plague occur during the fall and winter. The Chinese are being vaccinated, which makes smallpox not so common as in former years. Plague is not common and is usually of the bubonic variety. Trachoma occurs and skin diseases of all varieties abound.

CHINKIANG.

This walled city is a treaty port situated on the south bank of the river, about 180 miles from the sea. The population is estimated at 70,000, and just above the Chinese city on the water front is a British concession with a population of about 300.

The concession has fine wide streets, lighted by acetylene gas, and well-built houses. Back of the city and concession are low hills extending back to a mountain range. These hills are covered with Chinese graves and several fine stone missionary homes. The water

supply is obtained in the concession from a small water tower. Water is pumped up from the river and filtered and boiled in the homes before using. The Chinese in the walled city obtain their water from the river by means of buckets carried by coolies. Back on the hills there are a few wells.

There is one small hospital on a hill adjoining the concession, but it is so poorly built and furnished that it hardly deserves the name. Chinkiang is on the main line of the Shanghai & Nanking Railroad, only six hours from Shanghai over this road, and the hospitals of the latter city will have to be used when necessary. An American medical missionary has now under construction a two-story stone hospital, located on a hill back of the concession, but this is to be used exclusively for women.

In the hills back of the city are some very fine walks and well-built paths, also a recreation ground owned by the concession and kindly offered to the officers and crews of the gunboats for their use; this gives the sailors a place to go and enjoy good exercise when ashore. As ports go, along the river, Chinkiang is a very pleasant one to stop in.

NANKING.

Nanking is situated on the south bank of the river 47 miles above Chinkiang. It is the terminus of the Shanghai & Nanking Railroad and the capital of Kiangsu Province. The city has some fame in history, being the metropolis of the Empire and seat of the Chinese court until 1403. It was captured in the Tai Ping rebellion in 1853 and held until 1864, when it was recaptured by the imperial forces. It was also captured by the rebel forces in the late revolution, the complete destruction of the Tartar city being accomplished. A wall 23 miles in circumference and from 50 to 80 feet high surrounds the city, and the area inclosed shows much waste and farm land, and only a section occupied as a city. This section is to the southwest and fully 5 miles from the water front.

After entering the main gate there is a wide, well-constructed roadway leading up to the city proper, passing en route the home of the American consul, about 3 miles from the river, and a large, well-built hospital 4 miles from the water front. This hospital is in charge of the American Christain Mission and is connected with the medical department of the Nanking University, having several American instructors. The hospital is far from being clean, and the condition and equipment of the surgical section is crude. During the summer the Chinese doctors who are assistants are usually left in charge.

There were some cases of cholera here last summer, and schistosomiasis (japonicum) is seen. Tuberculosis and venereal diseases are very prevalent, and malaria occurs in the summer months. Summers are very hot and oppressive.

The port of Nanking is Hsiakuan, a small, dirty Chinese city situated between the wall and the water front and built on marsh land. The railroad station is located here about 500 yards from the water front.

There are no diversions here for the crew, there being no place to go excepting a trip to see the Ming Tombs, and no grounds for athletics.

WUHU.

Wuhu is 52 miles above Nanking and situated on the south bank of the river. It is a treaty port and a walled city. The land is generally flat, with a few hills, the latter occupied by the homes of foreigners. During the season of high water the country above and below the city is flooded, driving many of the Chinese from their homes into the city. The city is very dirty and the country surrounding is marked by many rice fields. Wuhu is a prominent port in the shipment of rice. Schistosomiasis (japonicum) is very prevalent in this section and Province.

On a prominent bluff just below the city is a group of four buildings, an American missionary hospital, one large building used as a hospital and the remainder as homes for the physician in charge, assistants, and nurses. The hospital is very well appointed and equipped and well managed. An American nurse acts as matron. There are several private rooms which are well furnished, and the operating facilities are excellent. The ship can anchor off the bluff within 200 yards of the hospital, which is very convenient for the transfer of patients. Its advantages of situation, equipment, and management make it the hospital of choice for our river gunboats when hospital facilities are needed.

The summers here are very warm, the temperature varying from 90° to 100°. The marshy land and rice fields offer excellent breeding places for mosquitoes and they are very numerous. There is nothing to interest the crew or offer mental or physical diversion. As a liberty port it compares with Nanking, lacking, however, the railroad advantages of the latter city.

ANKING.

This city is the capital of Anhwei Province, situated on the north bank of the river and 106 miles above Wuhu. It is inclosed by a high wall and has not yet been opened up as a treaty port. An American Methodist mission maintains a large school and hospital in the city, adjoining the wall farthest from the water front. The compound is nicely arranged, the hospital building large, with wards, rooms, and operating facilities excellent. An American physician is in charge, with an American nurse acting as matron. One great disadvantage is the location of the hospital, 2 miles from the river, and it is necessary to go this distance through the Chinese city to reach it.

KIUKIANG.

This city is situated in Kiangsi Province on the south bank of the river, surrounded by a wall 5 miles in circuit, 88 miles above Anking and 473 miles from Shanghai. It is a treaty port and just above the walled city on the water front is a small British concession, and directly behind and adjoining the concession is a Chinese suburb where most of the business houses are located. A railroad line, built and operated by the Japanese, will, when finished, connect Kiukiang with the capital of the Province, Nanchang, which is situated at the lower end of Poyang Lake.

The native city has a population of about 40,000, and there are 150 foreigners in the concession. In the native city and the suburbs the streets are narrow, dirty, and congested with traffic. The houses are closely built, and no provision is made for sewage or water supply. The latter is brought from the river in large buckets, and the sewage is carried back into the country to be used on the fields as a fertilizer.

The concession has two well-built streets shaded with trees, and a number of attractive, well-constructed buildings, which are used as homes and business houses. In the street back of the Bund and about 100 yards from the river is St. Vincent's Hospital, under the charge of French sisters of charity. A section is set off for foreigners, and the rooms are clean, cozy, airy, and comfortable. A small operating room is attached to this building, which is equipped well enough for general work. The hospital is open throughout the year for foreigners, with a British physician from the concession in professional charge. The sisters are most obliging, careful, attentive, and well trained as nurses. A rate of 6 taels a day (about $4.20) is charged, this including room, board, medicine, and professional care. This is the hospital of choice when the ship is in this section.

In the native city there is a large well-built hospital in connection with the American Methodist mission, but it is open only to women and has a female Chinese physician in charge. This hospital is kept very clean, has accommodations for 200 patients, and has an attractive tiled operating room not well equipped at this time. The operating room is a gift from an American woman.

There is a small park in the concession with tennis courts, the privileges being granted to officers, and in the American Methodist missionary compound is a large football field, which is offered to the crew for their pleasure when they desire it. The climatic conditions here show a very hot summer, a pleasant fall and spring, and a cold, windy winter, with considerable rain during January, February, and March. The usual diseases occur, but during the winter months many cases of schistosomiasis (japonicum) are seen in the hospital.

Kiukiang excels in the shipment of tea and as a shipping port for the manufacturers of imperial porcelains and pottery. The land surrounding the city shows a gradual incline about 8 miles back to the mountains, in which the famous resort of the river—Kuling—is situated.

KULING.

A summer resort located in the mountains back of Kiukiang and about 15 miles distant, with an altitude of 3,500 feet. During the summer it has a population varying from 1,000 to 1,500, composed mainly of missionaries and their families. It is reached from Kiukiang in chairs carried by six coolies over a well-made path, a very uncomfortable, jostling ride up a very steep mountain side, in some places almost precipitous.

Kuling is situated in a little valley at the top of the mountains, well protected by the crests, and with its altitude making it an ideal place during the summer months, the nights being cool and the days not too warm. There are many fine cottages built on the bungalow type of finished stone and owned by private individuals. There is also a good hotel capable of accommodating about 50 guests and charging $6 Mexican a day (about $3 United States currency) for room and meals. The resort is kept very clean, there being no Chinese in the concession excepting servants. The roads are merely wide paths, well built, and those leading to the cottages on the side hills have stone steps. Water is obtained from springs. On account of the cottages on the side hills and the absence of provision for sewage, this water has to be boiled before using.

There is one small private hospital here, operated by a Canadian physician and American and Canadian nurses. There are 6 well-furnished rooms and a very well equipped operating room. It would be an excellent hospital for the use of gunboats were it not for the difficulty of reaching it.

HANKOW.

This is the most important city of central China, situated at the junction of the Han River with the Yangtze. The city is irregularly L-shaped, the long arm extending along the Han River and the short arm along the banks of the Yangtze.

There is a large concession divided into English, Russian, French, German and Japanese sections and having a population of about 2,000 foreigners. This concession presents on the Yangtze River and has an excellent bund about 2 miles in length, well kept, shaded streets and many fine brick and stone buildings of imposing design.

During the late rebellion Hankow suffered severely; the native city was first bombarded by the rebels and later burned by the imperial troops. At the present time most of this burned area is

occupied by squatters living in crude thatched huts. Its former population was estimated at 500,000. The native city is being rebuilt and endeavors are being made to have it built upon modern plans with provisions for sewerage and water supply. The concession is sewered, draining into the river. A large waterworks is located back of the city and at present only the English section is connected with it, but provisions are being made to connect the other sections. In the meantime the water is obtained from the river and filtered and boiled in the different houses before using.

The city has a large ironworks on the opposite side of the Han River, a large paper mill, an extensive cigar and cigarette manufacturing plant, and several concerns manufacturing compressed tea blocks for European trade. Tea and rice are grown extensively in the surrounding country, and with the city's commanding position on an extensive network of small navigable streams it is destined to become the Chicago of the Orient. It is connected with Pekin by rail and there are eight steamship lines giving daily communication with Shanghai.

The summers are very hot, the temperature in July, August, and September ranging between 95° and 105°. Bugs, flies, and mosquitoes abound during this season to add to its discomforts, and all the foreign women and as many of the men as can get away go to some resort during these months. The spring and fall are delightful seasons and, with the exception of January and February, when it rains considerably, with cold, damp winds, the winter is cool and pleasant, the thermometer rarely going to zero.

There are three hospitals here, the London Mission, the Roman Catholic Mission, and the International Hospital. The London Mission hospital is open for Chinese only and is very poor in every respect. The Roman Catholic Mission has a hospital of about 150 beds, which can be easily increased to 400 from the large compound and several buildings in the mission. During the battles around Hankow this hospital was pushed to the limit and at one time contained 800 wounded. There are several private rooms, which, while not admirably furnished; are cosily so and it is the hospital used by our gunboats. The surgical equipment is not excellent, but it is sufficient for all needs, and the careful, quiet, and interested nursing by the sisters is all that could be desired. Two English physicians are in charge of the medical and surgical work and both are quite capable.

The International Hospital has been opened recently (since I have been in Hankow), and I am not acquainted with its arrangements or facilities.

Hankow is an excellent port to stop in, as there are many places where the crew can enjoy themselves. An international country

club, with extensive grounds laid out into a race course, tennis courts, golf course, and football and baseball grounds, kindly extends its privileges to the officers and crew. Sports can be had at any time of the year. They hold a spring and fall race meet and a gymkhana about four times a year.

YOCHOW.

Situated in Hunan Province, about 122 miles above Hankow, at the head of the outlet of Tung Ting Lake and 5 miles from the junction of the outlet with the Yangtze. It is a town of no importance commercially or otherwise, but can be mentioned as being one of the dirtiest and filthiest cities in China. An American mission is located here. Our gunboats stop here occasionally during the winter months when the water in the lake is so low that they can not proceed up to Changsha. There are no compradores, and it is sometimes difficult to obtain food. In the mission is a small hospital with about 20 beds and a Canadian physician in charge. It can be used when absolutely necessary, but it is advisable to proceed to Hankow when hospital facilities are demanded.

CHANGSHA.

This is an important city in the interior of China, being the capital of Hunan Province and located on the Siang River about 40 miles above the point where the river empties into Tung Ting Lake and 215 miles from Hankow. It is inclosed by a wall and is thickly settled with an estimated population of 300,000. The streets are wide and kept fairly clean, having a number of attractive business houses, and the city is said to possess considerable wealth. There are no facilities for sewage or water supply, the latter being obtained from the river, carried in buckets by coolies.

Several foreign missions are located here, one American, the Yale Mission, with which only graduates of that institution are connected. The buildings of this mission are located in the native city about 1 mile from the water front, and in their compound they maintain a hospital of about 50 beds, which is very poorly equipped. This is the only hospital in this section of China. For some reason not easily understood this hospital is closed to foreigners, only Chinese being admitted. During my stay there a sailor on an English gunboat, H. M. S. *Snipe*, contracted dysentery and was refused admission to the hospital, provision being made to care for him in a small Chinese building which was used as an overflow by the hospital.

ICHANG.

This city is situated on the Yangtze in Hupeh Province, 366 miles from Hankow, 950 miles from Shanghai, and is the head of ordinary steam navigation on the Yangtze. It is of importance only as a point

for the transshipment of goods from the river steamers to junks and vice versa for trade between western China and the coast. The native population is about 30,000 and the foreign 30.

The surrounding country is hilly. About 4 miles above Ichang the famous gorges begin, extending about 200 miles and affording the finest scenery in China, as well as the most perilous and thrilling navigation. In places the current runs 10 to 12 miles an hour. One small, high-power steam vessel, in charge of an expert pilot, makes the trip over the rapids, but the majority of the traffic and trade is carried in junks.

The homes of the foreigners are located just below the Chinese city in a section extensively covered with Chinese graves.

There is one small hospital here under the charge of the Scotch Mission, with two physicians and a few foreign nurses in charge; it is very poorly equipped.

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TRUMAN H. NEWBERRY,
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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the Hospital Corps in the performance of their duties and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to medical officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

C. F. Stokes,
Surgeon General, U. S. Navy.

U. S. NAVAL MEDICAL BULLETIN.

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SPECIAL ARTICLES.

SOME ASPECTS OF THE PROPHYLAXIS OF TYPHOID FEVER BY THE INJECTION OF KILLED CULTURES.

By C. S. BUTLER, surgeon, United States Navy.

Much evidence has recently accumulated to show the prophylactic effect of the so-called vaccination immunity against typhoid infection. Like all matters which are not capable of exact definition, opinions vary widely as to the value of this procedure; it is rated as paramount by some and as practically negligible by others. We find representatives of each opinion among sanitarians and internists on the one hand and among laboratory workers on the other.

There are those who believe that the immunity produced in typhoid is evanescent, and like that produced in pneumonia is sufficient for the cure, perhaps, and persists in a diminishing degree for a short period, but that the question of future infection is governed by the same conditions of tissue readiness combined with bacterial availability which result in primary infection. Not all who swallow typhoid bacilli acquire clinical typhoid fever. Those who hold this view will tell us that aside from any immunity conferred by an attack there is a certain disinclination to acquire typhoid on the part of the body which develops as age advances, and that if we could get figures of morbidity for say the decade from 40 to 50 for those who had had the disease once, these would represent approximately the primary incidence of typhoid for this period under similar conditions. We know that between 1 and 2 per cent have the disease the second time, while in pneumonia from 25 to 30 per cent give a history of multiple attacks. But whereas in pneumonia the specific cause is in constant attendance awaiting tissue readiness, this is by no means the case with respect to typhoid fever. We are at times liable to disregard the fact that in every infective disease we must

consider the condition of the host as well as the character of the infecting agent. Infective disease is the resultant of interaction between the organism and the micro-organism. In pneumonia the most important consideration is not the presence of the pneumococcus in the respiratory passages, for it is practically always there, but rather a receptive condition on the part of the tissues. While in typhoid fever, so far as we know, the most important desideratum is the presence of the bacilli, and our most important prophylactic measure is in preventing the entrance of this organism into the alimentary tract. This end is the one absolutely effective prophylactic to be sought after, and while its accomplishment to anything like a universal extent is doubtless a long way off, it is nevertheless not to be lost sight of and neglected for procedures which should be subservient to it.

At the present time there are no reliable figures which would settle the question of immunity after attack where conditions for infection were identical with those for nonimmunes. The question takes on some importance, however, in view of the findings of Metchnikoff and Besredka (1) in connection with typhoid fever in the chimpanzee. These observers immunized chimpanzees by means of vaccination as practiced upon human beings and then infected them with clinical typhoid fever by means of feeding experiments. Grünbaum had shown (2) that the chimpanzee is capable of acquiring clinical typhoid fever accompanied by a febrile reaction, septicemia and ulceration of Peyer's patches, and this condition was produced by Metchnikoff and Besredka in these animals while at the height of their vaccine immunity. Objection has been brought to the conclusions of these authors upon several grounds, none of which appears to be valid or able to bear inspection.

It will thus be seen that at least one objection requiring explanation has been propounded by the laboratory. From the standpoint of the epidemiologist there is the great difficulty in the way of drawing conclusions from the fact that like bodies of immunes and nonimmunes can not be subjected to exactly similar conditions for infection. Figures often compare conditions that are totally unlike in this regard. The nearest approach to the ideal condition for drawing conclusions from epidemiological comparisons is, perhaps, the typhoid record of the Second Division of the Seventh Army Corps assembled at Jacksonville, Fla., during the year 1898, and that of the Maneuver Division at San Antonio, Tex., during 1911. The following tables are taken from the paper of Lieut. Col. J. R. Kean, M. C., United States Army, published in a recent issue of the Journal of the American Medical Association (3).

1898.

Table showing for the regiments of the Second Division of the Seventh Army Corps, assembled at Jacksonville, Fla., the mortality and morbidity from typhoid fever.

Regiments.	Mean strength.	Cases of typhoid fever.		Deaths from typhoid fever.	Deaths from all diseases.
		Certain.	Certain and probable.		
Second Illinois	1,095	253	341	18	22
First North Carolina	1,164	147	227	16	20
Second New Jersey	1,153	185	318	29	32
First Wisconsin	1,232	209	311	46	48
Fiftieth Iowa	1,097	164	253	33	33
Ninth Illinois	1,288	153	248	18	28
Second Virginia	1,220	105	152	17	20
Fourth Virginia	1,274	135	231	21	28
Forty-ninth Iowa	1,236	378	612	50	50
Total	10,759	1,729	2,693	248	281

1911.

Table showing for the organizations composing the Maneuver Division at San Antonio, Tex., the morbidity and mortality from typhoid fever, March 10, to July 10, 1911.

Organization.	Mean strength, June.	Cases of typhoid, certain and probable.	Deaths from typhoid fever.	Deaths from all diseases.
Eleventh Infantry	924			
Fifteenth Infantry	969			2
Eighteenth Infantry	1,022			
Thirteenth Infantry	929			
Twenty-second Infantry	1,033			
Tenth Infantry	1,016			1
Seventeenth Infantry	954			
Twenty-eighth Infantry	951			
Third Field Artillery	847			2
Fourth Field Artillery	741			1
Engineer Battalion	536			1
Signal Corps	197			
Ninth Cavalry	744			
Eleventh Cavalry	1,143			3
Sanitary Troops	794	1		1
Total	12,801	1	0	11

A fair consideration of the conditions at these two camps will convince us that we can form no idea whatever of the actual part taken by vaccination in the good results gotten at San Antonio. There is no doubt that vaccination played a part, and perhaps a considerable part, in the attainment of these good results, but the comparison quoted can not measure it nor give any adequate idea of it. In the first place, the Florida encampment took place in 1898, which was in the "Dark Ages" of camp hygiene as far as we Americans are concerned. The epoch-making report from which the above-quoted figures were partly taken, and which did so much to show us that we

can not be coprophagists, and escape typhoid and dysentery, had at that time not appeared. During the 13 years between the Florida camp and the Texas camp this lesson had been well learned, as is attested by the excellent manner in which the excreta of both men and animals were disposed of at the latter place. Again, the Florida camp was composed of volunteer regiments, many of which were from the South and all recently recruited. They came bringing perhaps a high percentage of cases in the incubation stage, as well as a goodly number of typhoid carriers, the very existence of which latter we were unaware of in 1898, to say nothing of their deadly capacity to infect others. Over against this in the Texas camp the personnel to be handled was composed largely of men of the Regular Army who had been long in contact with officers both of the line and Medical Corps, and had imbibed those principles of personal neatness and personal hygiene which inevitably lead to a lower morbidity from any filth-born disease.

In many of the 1898 encampments it was a rather common experience to see flies with lime on their feet swarming over the food at mealtimes. Lime was used over the human excrement in these camps, and it required no stretch of the imagination to account for the manner in which the flies acquired the lime. We know that such things did not occur in the Texas camp. Most of the cases of typhoid fever were due to flies and contacts in the Florida camp. These two methods of transmission were adequately controlled in 1911. And it is safe to say that most of us would have preferred to go through the Texas maneuvers without vaccination than to have endured the Florida encampment with a high degree of vaccine immunity. At Jacksonville the mortality from diseases other than typhoid fever was three times as great as in the Texas encampment. There were only 19 cases of dysentery at San Antonio. Dysentery has been the scourge of armies ever since man took it upon himself to go to war. So far as is known it is communicated in exactly the same way as is typhoid fever. Yet nearly 13,000 men gave only 19 cases of dysentery during four months' residence in a semitropical country. This fact looks as if the sanitary measures employed were almost adequate in spite of the inability to control the food and drink taken by the men in the city of San Antonio.

In the Florida camp in 1898 there were hundreds of cases classified as diarrheal or dysenteric, while in the Texas camp there were only 19. As general sanitary measures would undoubtedly tend to diminish this class of cases while vaccination would in no wise influence their incidence, it is permissible to conclude that their absence from the Texas camp was a measure of the adequacy of the general sanitary measures employed. It is but a step further to reason that the

same precautions would prevent the presence of typhoid fever there. The board which studied typhoid fever in the United States military camps during the Spanish War (4) states on page 674, Volume I, of the report (General Statement No. 48) that—

when a command is thoroughly saturated with typhoid fever, it is probable that one-fourth to one-third of the men will be found susceptible to this disease.

They continue—

we are inclined to the opinion, but desire to state it only as an opinion, that typhoid fever disappeared in some regiments only after all the susceptible material had been exhausted. This was probably true in all regiments which had 400 or more cases.

In the Texas encampment only 9,000 of the 13,000 men had received the prophylactic up to July 1, which was 10 days before the camp was broken, so that at least 4,000 of them were, so far as the vaccine was concerned, nonimmunes, and therefore liable to infection with typhoid fever. Of the 2 cases of typhoid which occurred at San Antonio, 1 was in an immune and 1 in a nonimmune.

That there has been some influence other than vaccination which has operated to lower the yearly incidence of typhoid fever in the United States Army almost steadily since the Spanish-American War is shown by the table published by Maj. H. H. Russell, United States Army, on page 1364, Volume LIX, No. 15, of the Journal of the American Medical Association and reproduced here.

Decrease in typhoid following antityphoid vaccination.

Year.	Cases.		Deaths.		Vaccinated persons.	
	Number.	Rate per 1,000 mean strength.	Number.	Rate per 1,000 mean strength.	Cases.	Deaths.
1901	552	6.74	72	0.88		
1902	565	6.99	69	.85		
1903	348	5.14	30	.44		
1904	280	4.77	20	.33		
1905	193	3.39	17	.29		
1906	347	6.15	15	.26		
1907	208	3.87	16	.29		
1908	239	3.20	24	.31	0	
1909	282	3.35	22	.26	0	
1910	198	2.43	14	.17	0	
1911	68	.82	8	.097	12	1
1912 [1]	7	.20	1	.903	3	0

[1] Ratio for 1912 based on experiments for first half of year.

From this table it appears that the incidence of typhoid fever has fallen from 6.74 per 1,000 mean strength in 1901 to 2.43 per 1,000 in 1910. Sometime during 1910, 16,073 persons were inoculated (Russell, New York State Journal of Medicine, November, 1912). It is not stated whether all these persons were of the Army or not. From the above statements it would seem that we can not justly

attribute any considerable part of the good results gotten at San Antonio to vaccination, or at any rate we can not compare the two camps to the advantage of vaccination.

It is not the purpose of this argument to belittle the value of the vaccination form of prophylaxis, because, as intimated, I believe implicitly in its preventative power. But rather is it my purpose to point out that in our zeal to give vaccination due credit, we may do injustice to our other good friend, camp hygiene.

The Germans have shown us that by using intensive methods in diagnosis and isolation it is possible to rid a whole civil area of typhoid. In the 1911 maneuvers the attention of all the medical men of our Army was focused upon typhoid fever, and it is doubtful if a suspicious case would have gone longer than a few days without a diagnosis being made, and certainly those preventative measures which we know to be effective would have come into operation. In 1898 Army surgeons correctly diagnosed about one-half the cases, and in many of the camps there was widespread infection before the real diagnosis was made. In 1858 Budd told the world that the real source of danger in typhoid was the patient, and if we killed the infection as it left the patient's body typhoid would cease. In 1911 we were beginning to believe what he said.

Maj. Russell has stated (5) that up to the spring of 1912 among 70,000 individuals who were vaccinated there had been 14 cases of typhoid fever, with 1 death. This is a greater death rate and presumably a greater incidence than exists for some European cities, taking the whole unvaccinated population. Thus in 1908 Stockholm and The Hague had each 1 death per 100,000 from typhoid, Edinburgh and Christiania had each 2 deaths, while Munich had only 3 deaths per 100,000 for that year.

It would seem more logical to use the comparison between the Florida camp and the Texas camp rather as a justification of the policy of putting into the hands of medical officers of all the branches of the Government service sufficient authority in the placing and oversight of large collections of men, to make their knowledge of preventive medicine effective in the lowering of morbidity. Conclusion 21 of the above-quoted report (4) states:

> In our opinion it is of the greatest importance that more authority be granted medical officers in all matters pertaining to the hygiene of camps.

The implied recommendation had, in a large measure, borne fruit by 1911. There can be no denying the proposition, that those who have the responsibility of caring for the health of large bodies of soldiers and sailors should also have the authority to make their knowledge effective, for in these matters knowledge without authority is not much better than ignorance.

II.

The matter of immunity in typhoid fever is undoubtedly a very complex one. It can not be explained on the basis of the separate production of antiendotoxic, antibacterial, or opsonic bodies. The varied phases of the disease, the question of the relapse, and of the carrier state, all serve to convince us that in the immunity of typhoid fever we are dealing with a complex question. It is most easily explained by supposing that there is developed an amboceptor element which destroys the bacilli, an antiendotoxic element which tends to neutralize the toxin thus set at liberty, and an opsonic element which by sensitizing the bacilli renders them more susceptible to phagocytization. In addition to these substances, agglutinins and precipitins are produced which must have some active connection with the elimination of the bacteria from the system. Substantial reasons could be given, did space permit, for supposing that in a thoroughly immunized individual the sum total of the immunity is made up not alone of one of these elements but of all of them. Each of these immune elements is called into being as the result of a stimulus and each plays a part in ridding the patient of the infection or in neutralizing the liberated endotoxin. If no antiendotoxic substance were developed, only bacteriolytic substances, it is probable that every case of typhoid fever would die of toxemia. But all organisms do not react to the same degree in response to the same stimulus. One patient can not generate enough antitoxic substance to neutralize his poison and hence dies of toxemia, while another neutralizes the poison with such facility that we must exercise great care in the diagnosis of his disease. So, too, with regard to agglutinins, one patient will produce a regular avalanche, and we get a high titre agglutinating serum, while another will produce such a small amount that we are occasionally left in doubt as to whether his Widal reaction is positive or not.

The same principle is true in regard to bacteriolysins, opsonins, and perhaps to all the other elements of immunity. If true that the different elements of this immune state may develop to different degrees in different patients, it is likewise true that they may be developed to different degrees in the same patient. We admit this when we say that the estimate of the amount of the agglutinin present in an immune person does not necessarily measure his immunity. It is an established fact, I believe, that the different elements of the immune conditions do not have the same power of persisting in the human body. Take for instance the passive antitoxic immunity produced by inoculating a dose of diphtheria antitoxin. It lasts three weeks or less. We do not know whether active antitoxic immunity

would last any longer than this; it may and probably does quickly disappear after the stimulus to its production is no longer applied. That stimulus in the case of typhoid fever is the liberation of toxin by bacteriolysin, which bacteriolysin is in turn called into being by the presence of the specific antigen. Again, the individual may produce a large amount of bacteriolytic substance which is sufficient to kill all the organisms in his body and, in excretion, those also in his bile. Or he may produce a low and rapidly decreasing quantity which permits of a second invasion of the blood stream and lymph structures from the intestinal canal, having fallen rapidly below the point where it could control invasion and before the bile is rid of the bacilli. With a low and rapidly decreasing condition of the anti-endotoxic and bacteriolytic elements of this immunity we could reasonably explain the clinical relapse, while with a low and sustained bacteriolytic element of immunity we may find the explanation of the carrier state.

Practically 100 per cent of typhoid fever cases have bacilli in their bile at some time during the course of the disease. About 30 per cent also show the bacilli in the urine. Bile is an excellent culture medium for this organism, while urine is not. In the vast majority of cases both the bile and the urine are ultimately sterilized by natural processes. It is logical to conclude that the same agencies which sterilize the body fluids, by following the bacilli up in the excretions, also sterilize these. Excretion tends to lower the body content of antisubstances. The tissues, having produced sufficient antisubstance for their immediate wants, may stop this production when the stimulus is removed, that is, when all the bacilli in the tissues are destroyed. This may occur before the bile is rendered sterile; and so with an insufficient content to sterilize the bile, and a lowering body content, the immunity balance is destroyed and the bacilli again enter the tissues from the intestine, and we have the relapse. Again, autovaccination either from the gall bladder or the intestines may goad a sluggish body tissue into producing sufficient antibacterial substance to prevent further invasion of the tissues generally, but not enough to wipe out the stronghold of the bacilli in the bile. This is the carrier state. The experimental work of Johnston (6) upon the typhoid carrier state in rabbits tends to support this view of the explanation of the carrier state in man. We are told that a relapse may take place while the patient has considerable immunity. This may be and doubtless is true. But the very fact of a reinvasion is proof that the patient's immunity had quickly fallen below the point which it had attained a few days previously at the time when he started to recover. If the patient had had a large amount of that substance which destroys the bacilli and cures, are we asked to believe that nature had the means in her hand to destroy the bacilli,

but staid her hand? Durham (7) explains the relapse in the following terms:

> In studying any given infection we must not look upon it as a result of the reaction of a number of actually identical infecting individuals, but rather as the result of the action of a sum of a number of infecting agents, each of which is similar but not identical in its nature. In other words, an apparently simple infection with a given microbe is in reality a complex phenomenon brought about by a number of varieties and subvarieties of the given microbe; each of these varieties and subvarieties is neither identical with nor equivalent to the other. In any given infection the numbers of individuals belonging to the different varieties and subvarieties may be more or less equal. This may be called a "normal" infection, or one or more of the varieties may preponderate largely over the others, when it may be called an "abnormal" or "anisozymic" infection.
>
> Further, it must be allowed that each variety leads to the production of a corresponding antibody within the tissues of an animal; just as the original infecting dose consists of varieties and subvarieties, so does the resultant serum of the surviving infected animal contain nonequivalent varieties of antibodies, corresponding to these varieties and subvarieties, both qualitatively and quantitatively. It is to be presumed that the general constitution of the antibodies in the serum will be in accordance with the resultant of the sum of the varieties of the infecting agent.

Durham further explains that there may be sufficient immunity produced against one or more varieties to protect against reinfection by these, but not necessarily enough to protect against all varieties, so that some may reinvade the tissues and thus we get the relapse. There are many reasons why this theory does not seem fully to explain the relapse. No one doubts that a patient may be infected coincidently with typhoid bacilli from different sources. To recall some analogous cases we may be infected with typhoid fever and bacillary dysentery at the same time; this is, however, unusual. We may be infected with two or three species of the malarial organism simultaneously or with typhoid fever and malaria or with typhoid fever and cholera. It is unusual, however, that these coincident infections occur. It is very likely that in a single case of typhoid fever the entire infection would generally be received from the same source and would undoubtedly be by a single strain of typhoid bacilli which would have a common ancestry.

That there are any great differences in typhoid bacilli from different sources is very unlikely. In the first place they are alike in appearance, in motility, in staining characteristics, and culturally act alike in every particular. Chemically no one, so far as I am aware, has ever found any great differences in the typhoid bacilli in different parts of the world. It is very probable that the molecular structure of one strain of typhoid bacilli would differ in no essential particular from that of any other strain. It is also very probable that the immunity produced by inoculating these molecular combinations into animals or

men would differ in no essential particular, whatever the strain might be which was used in producing that immunity. That there are variations in degree produced by the same or different strains when inoculated into different animals or into man is what we should expect, for we are here dealing with the resultant of interaction between the organism and the micro-organism and all members of a species do not react to the same degree necessarily when subjected to the same stimulus. Otherwise all reactions to the typhoid vaccine in man should present approximately the same picture, which is not the case.

From the standpoint of the bacillus it would seem that Durham's theory of relapse presupposes a certain condition which we know does not obtain under natural conditions in the higher vegetable world. A nurseryman plants an apple tree and when the tree begins to bear he expects that its different apples will be alike in appearance, in taste, and in food value. There would, aside from quantitative differences, be little variation perhaps between the chemical characteristics of the different apples from this tree. On the other hand the nurseryman would be greatly surprised if he found that on the trees beginning to bear fruit some branches produced crab apples, others rusty coats, and still others Virginia Beauties. Russell (5) has pointed out that a typhoid immunity produced by any good vaccine is effective against all races of typhoid bacilli, and he intimates that a reasonable explanation why we have typhoid occasionally in the person of a man who has been vaccinated is because this man has lost his immunity, just as may occur after vaccination against smallpox. It may be added that we have at present no absolutely accurate means of stating how long the immunity in an effective degree persists after it is produced.

III.

Of the several methods used to estimate the amount of immunity following vaccination it has been shown that epidemiological estimates are faulty and open to error. The laboratory methods employed to estimate this immunity are likewise unsatisfactory. Absorption of the complement may tell us that a bacteriolytic substance is present, but it has not yet been made to tell accurately what amount is present, nor whether it is sufficient to prevent infection. It furthermore tells us a little about one element of the immunity and nothing at all about the other elements. Methods of estimating antitoxic and opsonic immune elements are unsatisfactory. The opsonic index is valueless as an index. All these laboratory methods are open to the same error, that they undertake to evaluate an individual's capacity to resist infection by estimating only the one ele-

ment of that capacity and disregarding the others. Some of the methods are not sensitive, and it may be that in applying them we are in the position of the chemist who would try to weigh out for a standard solution by means of hay scales. This brings us up to the question of the estimation of immunity to typhoid fever after vaccination by means of the agglutination reaction.

Specific agglutinins are produced in practically all cases of typhoid fever and in all men and animals inoculated with the prophylactic. Their constancy of production and steady increase as the vaccination proceeds or as the disease advances argues strongly that agglutinins are connected with and play some important and perhaps essential part in the immune process. Whether their function is in connection with bacteriolysis or with phagocytosis is not known, but it seems plausible to assume that they have to do with the economical use of the "ammunition of immunity" much as a pothunter would use a stool of decoys in order to get a whole flock of birds with a single charge. Looked at in this way agglutinins may be considered as adjuvants to both bacteriolysis and phagocytosis. So far as we know agglutinins persist as long as active immunity persists. Since their increase parallels the immune state in its production, it is reasonable to conclude that their decrease also parallels the loss of this immune state. Agglutination is without doubt the most accurate and by far the most wieldy method for obtaining some idea of the state of one's immunity. It must be appreciated, however, that agglutination tests are not absolute and are open to some sources of error.

IV.

Recently we have performed in the laboratory of the Cañacao Naval Hospital agglutination tests upon a considerable number of immunes who had been vaccinated for approximately one year. In this work it was at first planned to ascertain the agglutinating power of these sera by the macroscopic method, as this method is considered easier of application and quite as accurate as the miscroscopic method. It was soon found, however, that with sera of the class here considered the macroscopic method was not reliable for the following reasons: Macroscopic tests were performed by making emulsions in salt solution of an 18-hour old culture upon agar of *Bacillus typhosus* (a cross strain), and placing 0.5 c. c. of this emulsion in narrow test tubes with varying amounts of the serum to be tested. In this way dilutions of serum of 1 to 20, 1 to 40, 1 to 80, and 1 to 160 were employed, 24 hours being allowed for precipitation. A number of these sera were tried in this way, and at the same time a low dilution (1 to 40) was tried microscopically.

Without exception it was found difficult to say that in the 1 to 40 dilutions any of these sera gave a clearly positive reaction macroscopically, whereas microscopically they were all quickly and frankly positive when properly controlled, and using an 18-hour-old bouillon culture of the same bacillus which was employed in the macroscopic test. It was therefore decided to abandon the macroscopic method, and use only the microscopic method.

It was deemed advisable to use the microscopic test with the sera of several units of these immunes in different dilutions, and to disregard the question of the exact potency of any one serum. Thus one unit of, say, 50 men would have their sera tested all at a dilution of 1 to 40, another unit at 1 to 100, and still another at a dilution of 1 to 200. None of the sera were tested in higher dilution than the last figure. Results gotten in this way will give information, not as to the absolute resistance to infection of any particular man, but rather some idea as to the capacity of the whole unit to resist typhoid infection. If it should be found, for instance, that only 30 per cent of a certain ship's company gave positive agglutination reactions in a dilution of 1 to 40, while 70 per cent of another ship's company gave positive agglutination tests in a dilution of 1 to 200, it would seem reasonable to conclude that the latter would be far less liable to typhoid infection than the former. I submit, that this index may be actually used to advantage in epidemiological work, very much as the spleen index or parasite index is used to estimate the amount of infection of any population by malaria. It would have this difference, that while the spleen index is used in estimating the number probably infected, this "agglutinative index" would serve to indicate the probable capacity of a given body of supposed immunes to become infected with typhoid fever. The "agglutinative index" can be stated in the form of a fraction of which the numerator is the figure representing the percentage of positive agglutination tests in any body of men, while the denominator is the serum dilution employed; that is, the figure representing the serum dilution.

The total number of sera in our series is 233. Of this number, one person was known to have had typhoid two years previously and had not been inoculated. The agglutination reaction in this case was positive in a dilution of 1 to 40. One individual had been vaccinated three years previously and the blood serum in this case showed no tendency to agglutinate typhoid bacilli within one hour at a dilution of 1 to 40. All others included in this series were inoculated approximately one year previously, that is, in March or early April, 1912, and their agglutination tests were performed between the 15th of March and the 5th of April, 1913. The following gives the results:

Unit No. 1, consisting of 158 men, gave 8 negative reactions, using a serum dilution of 1 to 40, that is 5.08 per cent.

Unit No. 2, consisting of 24 men, gave 3 negative reactions, using a serum dilution of 1 to 100, that is 15.5 per cent.

Unit No. 3, consisting of 51 men, gave 15 negative reactions, using a serum dilution of 1 to 200, that is 29.4 per cent.

The results stated in positive percentages were as follows:

	Per cent positive.
Unit No. 1	94.92
Unit No. 2	87.9
Unit No. 3	7.6

The "agglutination indices" would therefore be for—

Unit No. 1 $\frac{95}{40}$
Unit No. 2 $\frac{88}{100}$ } Using the nearest percentage whole number as numerator.
Unit No. 3 $\frac{71}{200}$

All of the agglutination tests embraced in the above report were done with a cross strain, that is, with a strain other than the one used in producing the vaccine with which these persons were vaccinated. Room temperature bouillon cultures of approximately 18 hours' growth were used entirely. Blood serum dilutions were made with blood counting pipettes. Standards for reactions were as follows: A normal serum control was used for each set of reactions. With 1 to 40 dilutions the time limit was 30 minutes, with 1 to 100 dilutions the time limit was 1 hour, and with 1 to 200 dilutions the time limit was 2 hours. A positive reaction was read when all the bacilli were clumped, and there was no motile, or only an occasional motile, bacillus between. A bacillus will occasionally break from a clump and move for a short time among the other clumps.

The vaccine which has been used almost entirely on the Asiatic Station for typhoid prophylaxis has been prepared in the laboratory of the Naval Hospital, Cañacao, P. I. A small amount of Army vaccine has been used also. No differences have been noted in the capacity to produce agglutinins between the two. Our vaccine is simply a 24-hour culture of *Bacillus typhosus* (we have used three different strains at different times) in bouillon of a reaction of about +0.5. It is sterilized in 2,000 c. c. quantities in large bottles. Having been incubated overnight to insure sterility, a 10 c. c. bouillon culture of *Bacillus typhosus*, which has grown 12 hours at 37°, is poured into the 2,000 c. c. and the whole incubated for 24 hours at 37°. At the end of exactly 24 hours the cotton plug is replaced by a sterile rubber stopper carrying a glass tube 12 inches long which is cotton plugged at its upper end. This is to extend above the water in the sterilizer. It is well to tie the rubber stopper in place while sterilizing. The glass tube, of course, is to equalize the pressure in the bottle while undergoing sterilization. The bottle is then clamped on to a burette stand and immersed in a large amount of water (suf-

ficient to cover the entire bottle and the lower portion of the glass tube for about 2 inches) at 60° C., which is kept at this temperature for 1 hour. The bottle is then opened, taking care not to infect the vaccine, and 0.5 per cent carbolic acid is introduced and dissolved by shaking. A special filling apparatus connected with a rubber stopper (the whole having been carefully sterilized) is joined on and the vaccine run into sterile bottles of any desired size. The bottles are immediately closed with autoclaved corks taken out of boiling paraffine. As the bottles are being filled a culture tube of bouillon is inoculated with a few drops of the vaccine at the end of each 100 c. c. bottled. This series of controls is incubated overnight and must all be sterile on the following morning or the entire amount of vaccine is discarded.

To test the toxicity, 2 c. c. of the vaccine is inoculated into each of two rabbits and two guinea pigs. No anaerobic control is necessary, as spore bearers can be excluded by sterilization with this vaccine, which is not the case with the vaccine of smallpox. It is unlikely that anaerobic spore-bearing bacilli would persist if we killed all the aerobic ones. The test of toxicity and the standard conditions of growth of the vaccine are relied upon to give us a standard dosage. No standardization by counting is done, as no one of these methods is as good as a real good guess. Furthermore, we can not standardize the man inoculated, and one man may get more reaction from 0.5 of a c. c. than will another from 2 c. c. Some of the worst reactions I have seen have been in persons who had previously had typhoid fever. As a container, a good, sterile bottle closed with a tightly-fitting, sterile, well-paraffined cork is as good as an ampule and much more convenient, both for the man who makes the vaccine and for the man who uses it. The vaccine will keep sterile indefinitely in such a bottle if it is sterile when sealed. Furthermore, the use of the bottle as a container promotes cheapness of the product, and cheapness encourages the tendency to use the vaccine fresh, which is, it seems to me, of more importance than the matter of whether the vaccine is killed at exactly 53° or 57° C.

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WILLIAM LONGSHAW, JR., ASSISTANT SURGEON, UNITED STATES NAVY (1839–1865).

A Biographical Sketch.

By J. D. GATEWOOD, medical director, United States Navy.

There is not much material with which to make the background of this sketch, and for the same reason the sketch itself is more or less indefinite in parts. But some histories, like some paintings, are more worthy of attention on account of subject portrayed that on manner or method of portrayal in detail. The mind does not require detail for the appreciation of beauty in anything in land or sky, for the imagination that has created song and legend and those ideals that have dominated the lives of men is among the most precious possessions of the human race. And many things examined closely lack all the beauty they acquire at a distance.

One may like to delve into family history to find therein the source of a hero's inherent strength, and one may find pleasure in depicting the environment of early life in the effort to trace the influences that guided or controlled the development of a hero's mind; but from that source have come many of the legends that adorn the pages of history.

However, it must be confessed that the material composing this sketch is all that is available. It is spread before you in definite attempt to depict one built on heroic lines. But it is recognized that in many cases, even in those of men now living, appearance and manner and degree of education have given no clue to heroic possibilities, for even out of the commonplace may come the sublime act that forever ennobles the memory of the individual. Surely purple and fine linen, and opportunity in general, often throttle aspiration and endeavor. And many, many times obstacles have developed the strength to overcome and to go down with an undisturbed mind even into the valley of death, whether of body or of expectation. Heroism is often nothing more or less than ability to make the recognized losing fight to the end.

The subject of this sketch, William Longshaw, jr., was born on April 26, 1839, at Manchester (practically a part of Richmond), Va. It appears that he was not of a Virginia family and that he remained in Virginia a short time only, the family going to Kentucky for a year or two and ultimately to Cambridge, Mass. The father, Dr. William Longshaw, sr., and the mother, Margaret Davies, were both born in England, and came to this country soon after their marriage. It is said that the father was a university man and of some local repute as a scholar. They both died at Cambridge, Mass. The father's father and mother were John Gaunt Longshaw and Catherine, both of England. However, the mother's mother was Marie

Guyott, whose letters were always in French. It is said that the name Longshaw is itself of French origin and was originally Longchamp.

The young Longshaw, removed from Virginia, next appears in Boston, where he attended the Lyman School and was awarded the Franklin medal. After that achievement he was a pupil at the high school of the same city. His general education seems to have been completed at the Phillips Academy, Andover, where he pursued a classical course for two years. He was not, from the general educational point of view, a college man, and he disclaimed knowledge of any branch of natural history or of any modern language.

It is not easy to imagine him at the time he left the Phillips Academy and began the study of medicine. He was but a lad, about 16 years of age, and average height, with gray eyes, darkening hair, and fair skin. There is a suggestion that he was frequently about a drug store at that time. In fact, it seems likely that he enjoyed exceptional opportunities in that respect from early childhood. Certainly he soon became familiar with the physical properties of drugs and with methods of compounding prescriptions. The acquisition of such knowledge probably caused the birth of the lad's ambition to become one of those who write prescriptions rather than one who compounds them.

At any rate he was not more than 16 years of age when he began the study of medicine. His first preceptor was Moses Clarke, at East Cambridge, and he remained his pupil for a year. During that year there were no lectures, and it seems probable the medical study was more or less desultory. An immature mind, accustomed to the routine of school life, finds much difficulty in working without such a routine, especially when new and difficult studies are undertaken, and the study of anatomy soon becomes irksome under such circumstances. Besides, one can suppose that pharmaceutical work had attractions or was even more or less compulsory.

However, the next year was more satisfactory. There was removal to New York and attendance on lectures at the University of New York, with Valentine Mott and T. C. Finnell as preceptors. That situation continued for only one year and was followed by considerable wandering without, at this time, apparent cause.

The year after the one in New York City was spent at New Orleans and Bayou Lara, La. There was a preceptor with attendance on lectures at the University of Louisiana. At that time young Longshaw was about 18 years of age, and it may be the going to Louisiana was incident to occupation as a pharmacist, necessitated by financial requirements. That seems probable, because after a year at the University of Louisiana there was no systematic study of medicine

TO THE MEMORY OF

WILLIAM LONGSHAW, JR.,

ASSISTANT SURGEON, U. S. NAVY,

WHO WAS BORN IN MANCHESTER, VIRGINIA,

ON THE 26TH APRIL, 1839,

AND DIED AT FORT FISHER, NORTH CAROLINA,

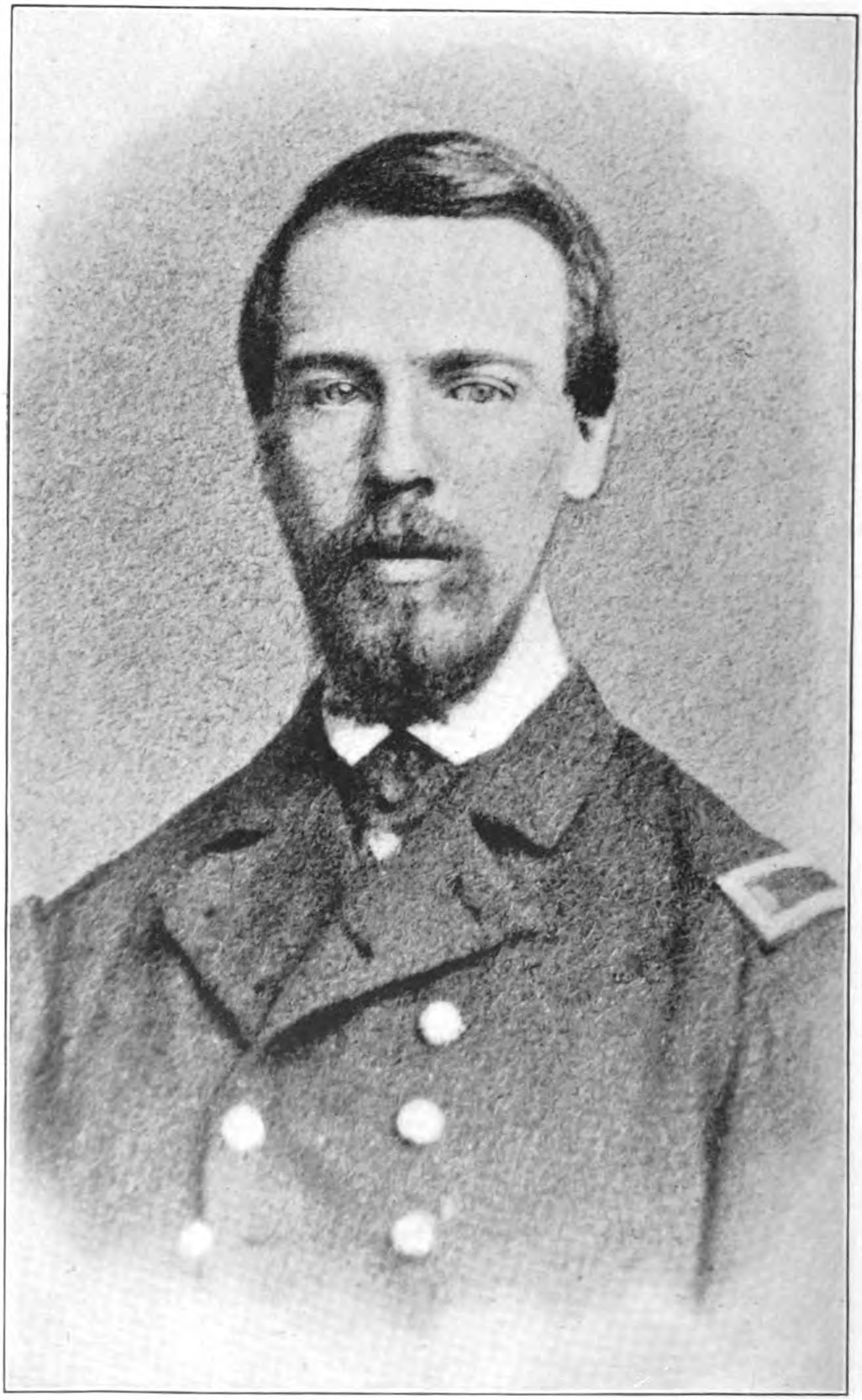
ON THE 15TH JANUARY, 1865.

In 1862 he entered the Medical Corps of the U. S. Navy, and in 1863 was distinguished for bravery in the saving of the U. S. S. *Lehigh* under the guns of Fort Moultrie. The story of his gallant conduct was twice read on the quarter decks of 60 ships. In 1865 he was killed in the assault and under the walls of Fort Fisher, while attending to the wants of wounded men, and, by his example, cheering the faltering and encouraging the timid.

He was shot in the line of duty while in the act of saving the life of a wounded man, and their dead bodies were found lying on the sand side by side.

His remains have mingled with the earth, but his memory will be an inspiration forever.

"DUTY STRONGER THAN LOVE OF LIFE."



WILLIAM LONGSHAW, JR.

for about 12 months, the time having been occupied as a drug clerk in Bayou Lara, probably for the purpose of obtaining money for completion of medical education.

The combination of pharmaceutical work with effort to secure a medical education seems to have been a prominent feature in his career. One recognizes here a situation likely to cultivate considerable self-reliance and not a little initiative. He was young, thrown on his own resources, and struggling to fit himself for a medical career.

It was during the summer of the year in New Orleans that he was in the trying situation of working in the face of such a disease as yellow fever. He was only 18 years of age, unattached, and living among strangers, but he remained during the entire epidemic and took an active part in the work, assisting physicians under the auspices of the Howard Association. This was doubtless an eventful part of his life, but he himself seems to have regarded it as merely a time of medical experience.

After a year at Bayou Lara he seems to have acquired sufficient money to continue his work in medicine. But, probably for climatic reasons, he did not remain in Louisiana. At any rate, it was after a year in the medical department of the University of Michigan that he obtained his medical degree. That was the class of 1859, and when he was in his twenty-first year.

While a student at the University of Michigan he acted as clinical assistant to the professor of surgery, and after graduation had some experience in medicine and surgery, "having had charge of four wards of an Army hospital." However, there does not seem to be satisfactory information of his life between the time of graduation and of beginning of association with the naval service in 1862.

In addition to his medical degree he obtained from the University of Michigan a special diploma in chemistry, both qualitative and quantitative analyses, and by 1862 he not only had much practical knowledge of pharmacy from having been three years a drug clerk, but also sufficient standing in pharmacy to be a member of the American Pharmaceutical Association.

Dr. Longshaw was appointed an acting assistant surgeon in the Navy on June 25, 1862, and on June 30, 1862, was ordered to the U. S. S. *Yankee*, a side-wheel gunboat of four guns, forming part of the Potomac Flotilla. While attached to the *Yankee* he was ordered to appear before a board of three medical officers at the Naval Asylum—now Naval Home—Philadelphia, for examination for appointment as assistant surgeon. He reported there on August 14, 1862.

It appears that the examination was completed satisfactorily in two or three days. At that time the total maximum mark was 780, with 540, or about 69.2 per cent, as the minimum requirement. Dr. Longshaw's total was 595, or about 76.2 per cent. His personality was evidently regarded very favorably by the board, as he was given 85 in general aptitude. He made the same mark, 85 per cent, in literary and scientific branches. Certainly his handwriting, orthography, English construction, and expressed knowledge declared him to be above the average in general education.

The only physical description made of him at that time is as follows: Age, 23 years and 4 months; height, 5 feet 8 inches; complexion, light; eyes, grey; hair, dark; physical qualifications, good. He gave his residence as Cambridge, Mass.

It may be well to recall that the year 1862 was part of the most sorrowful period in the history of the Republic. But it was a stirring and hero-making period. The whole country was in the throes of civil war, and men afloat and ashore were engaged in a death struggle that, in its heroic fortitude, endurance, and self-sacrifice, must ever excite the admiration of mankind. It was the kind of period that always appeals to the imagination—to those who love to take part in stirring events and who recognize that they reach the high plane of their strength amid hardship and danger. And many things can be recorded in favor of him who in his youth and enthusiasm comes forward in time of great need and, as a fearless man fit for the supreme sacrifice, makes a place for himself in the great game of war. It is a great game, but to the individual it also often comes as a great duty—as an imperative call, to which the greatest minds of history have responded. Yet the majority of men are followers, the sentiment prevailing in a locality assuming the status of a belief or acquiring the force of a social, or even religious, code.

Dr. Longshaw, having passed the examining board, returned to the *Yankee*. He served on that vessel until October 17, 1862, as an acting assistant surgeon, when he was placed on waiting orders. He did not receive his appointment as an assistant surgeon until November 9, 1862. On November 21 he was ordered to the receiving ship at Boston, and until March 16, 1863, when he was ordered to the U. S. S. *Passaic*, he served either on that receiving ship or as a medical officer of the Boston Navy Yard.

That must have been a period of marked restlessness for one of adventurous spirit. The mind of a nation was concentrated on war, the greatest of all tragedies was in progress; an enormous arena, made up of mountain, valley, river, and ocean itself, was the scene of a drama that enthralled the mind of wondering millions. The earth went on its undisturbed way, in sunshine and shadow, through

the starry spaces, but vast areas of its surface were the scene of bloody contention and human sacrifice and wonderful deeds that immortalized memories, and of wonderful efforts that through the sternest school of human experience taught the minds of men the lifting power of duty well performed—of a sense of duty stronger than the love of life.

At that time the Navy was almost daily adding to its force. The navy yards, the Boston yard included, exhibited a feverish activity. Ships were built, and many purchased ships were transformed into vessels of war. The list of vessels contained about 400 names, and the five blockading squadrons, including that on the Mississippi, were composed of perhaps 300 vessels, large and small.

The *Passaic*, to which Asst. Surg. Longshaw was ordered in March, 1863, was attached to what was known as the South Atlantic Blockading Squadron, consisting of 60 vessels.

She was an iron single-turret monitor of 1,875 tons displacement, with two smoothbore guns of very large caliber. One can remember her as at the Naval Academy many years after the war, a scarred and battered veteran, the turret showing deep indentations from shot received. She was a dignified representative of a great struggle, but one can imagine with difficulty the discomfort of living on such a vessel in southern waters, in days when construction was deficient in relation to ventilation and heat transference. It may also be noted that those were the days of an interesting and often fatal disease known as "ironclad fever."

The *Monitor* and *Merrimac* inaugurated the era of ironclads, and the startling demonstration of destructive value of the *Merrimac* against wooden vessels, that up to the moment of that trial had been regarded as representative of the terrible power of naval activities, served to focus the naval mind upon ships of the turret type when the *Monitor* came in, as if by miracle, between the devastating metal of a single iron-railed monster and the ripping oaken sides of glorious memory.

One can see how, under the situation of such spectacular results and expectation of wonderful achievements, both enemies labored with feverish activity, but with very different degrees of facility, to build and float iron walls of protection. Everything was expected from the ironclad, and guns in turret were thought by many to be capable of sweeping away forts and defenders, however gallant.

The *Passaic* was one of a number of single-turret monitors representing this new phase in naval construction—slow moving, difficult to handle at sea, wave swept, and taking in water in every gale that often burdened pumps, laboring to keep the the engine-room floor plates clear, and half smothering crews subjected to great heat and

foul air. Voyage from one port to another was always in tow, and safe arrival always a relief.

Yet, down the coast they went from the shipbuilding plants of the north to gather in grim force for the hopeless task of razing the gallantly defended defenses of Charleston.

The *Passaic* was at sea in tow the same night the *Monitor*, in tow of the *Rhode Island*, found a grave off Hatteras. The ironclads were only a few miles apart and the *Passaic* was perilously near a like fate.

But Port Royal was reached at last from Beaufort, N. C., and on April 7, 1863, the *Passaic* was battered, injured, and terribly scarred in the attack of the ironclads on the defenses of Charleston.

It may have been on that date that Dr. Longshaw first found himself under fire of great guns. He was ordered to the *Passaic* on March 16, 1863, after that vessel had made the perilous voyage from New York, and he may have arrived in time for that memorable April day when the ship was gouged and dented by many shot, and shaken by one in particular that disabled the turret and nearly found its way through the heaviest plates then afloat. It was a true baptism of fire and this ship, then in her young days, exhibited her scars for many years, but none ever attracted the attention compelled by the impression of that one shot that nearly forced its way through her iron turret base.

Dr. Longshaw remained on the *Passaic* until May 30, 1863, when he was ordered to the *Penobscot*, but his acquaintance with the ironclad type was only interrupted for a short time, as on August 11, 1863, he was ordered to the *Lehigh*, a sister ship of the *Passaic* and a more recent arrival in southern waters. She too soon received her baptism of fire, and under circumstances that should forever link the names *Lehigh* and Longshaw.

It appears that on the evening of November 15, 1863, Fort Moultrie opened a very heavy fire upon the Federal works on Morris Island, and that night (10 p. m.) Rear Admiral Dahlgren, commanding the South Atlantic Blockading Squadron, in the *Philadelphia* anchored off Morris Island, complying with the request of Gen. Gillmore, ordered the monitors on picket, the *Lehigh* and *Nahant*, to move up to prevent any attack by boats on the sea face of Cumming's Point.

The *Lehigh* took position suitable for that purpose and anchored, but the vessel, swinging with the tide, grounded, and at daylight could not move from her dangerous position under the guns of the many batteries on Sullivan's Island, which soon opened on her.

The *Nahant*, being the nearest vessel, soon arrived to render assistance. "Shot and shell from cannon and mortars were flying and breaking all around." In fact the *Lehigh* was struck 22 times, 9 wounds on the deck plating.

The problem was to pass a hawser from the *Nahant* to the *Lehigh*. This was done on three occasions, the first two hawsers having been shot away. The ship was in the concentrated fire of nine batteries.

The lines for the first two hawsers were carried by Asst. Surg. William Longshaw, jr. That voluntary service was rendered with promptness and alacrity. The small boat was manned by George W. Leland (gunner's mate) and Thomas Irving (coxswain). Twice this medical officer passed from *Lehigh* to *Nahant* and back, carrying a line bent on the hawser, and twice the hawser was shot away. And doubtless he would have carried it the third time, but purely medical duties interposed—there were wounded 1 officer and 6 men, two seriously.

The *Lehigh* was eventually floated, but the meritorious service of the medical officer of the *Lehigh* under severe fire could not be allowed to go without official recognition. Commander Bryson of the *Lehigh* in his official report includes the following:

> I would especially mention the valuable service voluntarily rendered by Asst. Surg. Longshaw.

Rear Admiral Dahlgren in his report to the department wrote as follows:

> Twice he passed in a small boat from the *Lehigh* to the *Nahant*, carrying a line bent on the hawser. The shot and shell from cannon and mortars were flying and breaking all around.

He gave "appointments as (acting) master's mates to the two petty officers who rowed Dr. Longshaw." He recommended Dr. Longshaw to the notice of the department, with the observation that he risked his life to save an invaluable vessel. And that rear admiral, Commanding the South Atlantic Blockading Squadron, did more. He promptly issued a general order to "be read on every quarter deck of the fleet at the next general muster after its reception." He had witnessed the whole occurrence, having come up in the *Passaic*, and the opening paragraph of his general order makes good reading:

> It is a gratifying duty to observe and make known the conduct of officers and men which obviously deserve such notice, particularly under fire.

He then gives the situation of the *Lehigh*, and mentions by name all the individuals who took prominent part in saving that vessel. In relation to Dr. Longshaw the language is as follows:

> Three times a line to pass a hawser was conveyed from the *Nahant* to the *Lehigh*, twice by Dr. Longshaw, the surgeon of the *Lehigh*.

He mentions the promotion he has given to the enlisted men concerned, and writes:

> I shall also make honorable mention of them to the honorable Secretary of the Navy, which is all I can do for Dr. Longshaw. It is not in my power to reward him suitably.

It is of interest to note that Rear Admiral Dahlgren's report to the department on the grounding of the *Lehigh* secured the following indorsement:

BUREAU OF MEDICINE AND SURGERY,
November 28, 1863.

I beg leave to recommend. as a recognition of the gallant conduct and efficient service under a heavy fire of shot and shell from the enemy's cannon and mortars, of Asst. Surg. William Longshaw of the monitor *Lehigh*, so amply set forth by Rear Admiral Dahlgren in general orders of the 17th instant, that an order issue giving Asst. Surg. Longshaw the privilege of examination as soon as his two years' sea service required by law shall be completed; if successful, that he shall rank as passed assistant surgeon from the date of his examination, without reference to others of his date or class.

W. WHELAN, *Chief of Bureau.*

Upon that recommendation the department sent the following letter to Dr. Longshaw:

NAVY DEPARTMENT, *December 1, 1863.*

SIR: In consideration of your gallant conduct in twice carrying a line to pass a hawser from the *Nahant* to the *Lehigh*, the latter vessel being under a heavy fire of shot and shell from cannon and mortars of the enemy, as reported by Rear Admiral Dahlgren in general orders of the 17th ultimo, the department grants you the privilege of presenting yourself for examination as soon as you have completed the two years' sea service required by law.

If successful you will take rank as passed assistant surgeon from the date of your examination, and without reference to others of your date or class.

Very respectfully,

GIDEON WELLES, *Secretary of the Navy.*

Just here it is worthy of note that Dr. Longshaw could never avail himself of the distinguishing, but long-delayed and uncertain privilege granted by this letter. He began on March 16, 1863, the two years' sea service required by law, and was killed in action before that service was completed. And certainly the privilege of appearing for a difficult examination immediately after the completion of two years' service at sea during a period of war imposed an additional burden of anxiety upon one living under the physically depressing influences of such a vessel as the ironclad *Lehigh*.

On December 2, 1863, the department acknowledged the receipt of Rear Admiral Dahlgren's report on the grounding of the *Lehigh*. In that communication Secretary Welles recognized the services of officers and men mentioned in the report, naming each and bestowing promotions and medals of honor on the enlisted men concerned. In mentioning Dr. Longshaw he refers to and quotes the language of the letter given above. Rear Admiral Dahlgren made the department's letter to him part of another general order, stating that "it affords a gratifying assurance that meritorious acts will not pass unnoticed," and directing that the Secretary's letter "be read on the quarter-deck to the officers and men of each vessel of the squadron the day after its

receipt." Thus the gallant conduct of Dr. Longshaw, the medical officer of the *Lehigh*, was published twice on the quarter-decks of perhaps 60 vessels of the Navy.

One can imagine the surprise of the recipient of such honor. Doubtless one who even in the days of boyhood had quietly worked during an entire summer face to face with yellow fever, and who at the time of the grounding of the *Lehigh* had been a naval officer for only little more than a year, pondered somewhat over the standards of heroism prescribed the world over. And subsequent events leading to his death in action when "attending to the wants of wounded men, and by his example cheering the faltering, encouraging the timid" on the field of battle, show not only that he had the medical mind and was essentially a medical officer, but also that there are duties strictly within the purview of a naval medical officer that require in their performance the highest order of heroism, yet cause, under the military code, a much more limited degree of prominence. Certainly the conduct, to be described, of Dr. Longshaw on the sand before Fort Fisher will be considered by many to represent an even higher order of heroism than that displayed on the memorable November day when the *Lehigh* was aground under the terrific fire of Fort Moultrie. But he who reads can form his own opinion.

On December 30, 1863, Dr. Longshaw was detached from the *Lehigh* and ordered to the *Minnesota*, then the flagship of the North Atlantic Blockading Squadron. The *Minnesota* was one of the great frigates of her day—a full-rigged wooden ship with auxiliary steam (screw), 46 guns, and 4,700 tons displacement. Such ships were the best habitations afloat in those days.

During 1864 the *Minnesota* was much of the time at Hampton Roads, Va., and Beaufort, N. C., and during that time the Navy was perfecting its plan to have the Army cooperate with it in taking the defenses of Wilmington, N. C.

A civil war is the most intense and bitter of all wars and certainly no enemies were ever more enterprising than in this war between the North and South. It required skill, courage, and enterprise to successfully utilize Wilmington for receipt and shipment of cargoes in the face of such an immense and active blockading squadron. That was true not only in relation to the blockade running itself, but also in relation to the location, building, and defense of Fort Fisher and its adjacent batteries.

It was quite logical for the Navy of the North to be the first to advance a plan of cooperation with the Army of the North for making Wilmington useless to the Confederacy by rendering its defenses useless. The Navy was early aware of the degree of utilization as a port and, owing to shoal water at the mouth of the Cape

Fear River, realized that only an attack made ashore and afloat could meet with success. Therefore, it was the Navy that was impressing upon the War Department the necessity for the undertaking and, as its representation did not meet with compliance, submitted its plea to President Lincoln in October, 1864.

By that time the North Atlantic Blockading Squadron had been increased to 150 vessels and Rear Admiral Porter had been selected to command it. The *Malvern*, a side-wheel steamer, was his flagship and the *Minnesota* headed only a division of the squadron.

The first attack upon Fort Fisher and adjacent works was made on December 24 and 25, 1864. The *Minnesota* was one of about 37 vessels on the firing line. That ship was stationed with others about a mile from the forts and in the two days they expended projectiles weighing more than 1,275,299 pounds. The admiral considered the fort to be "so blown up, burst up, and torn up that the people inside had no intention of fighting any longer." However, the Army reembarked without having assaulted. The military authority reported that the works remained "substantially uninjured."

During that action the *Minnesota* was struck several times. Some of the shot struck the hull, which over engine and boilers was protected with chain.

In the record of that first attack upon Fort Fisher Dr. Longshaw does not appear by name. His fortunes were merely those of the ship to which he was attached. It was a fight of ships and fort, and it is said that the last four broadsides of the *Minnesota* "were of the most terrific character" and "that the shell fell like a perfect hailstorm upon Fort Fisher." However, there were no casualties reported on the ship and she received little or no damage, though 8 or 10 shots touched her. It was an experience in which all shared.

But that was not the situation in the second attack, January 13–15, 1865. After hammering the forts and helping the Army to land 8,000 men, the Navy landed on the 15th about 2,000 of its sailors and marines who, over the bare sand, attempted to rush the fort on one side while the Army was effecting an entrance on another. It was under such circumstances that Dr. Longshaw again appears in the records of that war—this time as a medical officer doing strictly naval medical duties.

> He was under the walls of Fort Fisher attending to the wants of wounded men, and by his example, cheering the faltering, encouraging the timid, and displayed a spirit very worthy of commendation.

He was there in the midst of panic, with men falling around him. He was there without power of offense or defense. He had first-aid material and the medical mind fixed upon men in need of help. He was there on the storm-swept plain to attend to the wants of wounded

men and by his example to cheer the faltering and encourage the timid. And he did it. Read the report made by Lieut. Commander James Parker, who commanded the landing party from the *Minnesota* on that day, January 15, 1865, when the very gallantly defended Fort Fisher succumbed:

> Asst. Surg. William Longshaw, jr., after adding to the reputation for bravery which he gained under fire of the batteries at Charleston while serving on board the ironclad *Lehigh*, was shot by the enemy as he was binding up the wounds of a dying man. Their dead bodies were found lying side by side the next morning.

Their dead bodies were found lying side by side the next morning. Is not that an example for all time? Certainly nothing could more eloquently portray the actuating ideal of all naval life, "Duty stronger than love of life."

On that memorable morning of January 15, 1895, the landing party from the *Minnesota* consisted of 241, including 51 marines. It left the ship at 11 o'clock and landed 1 mile and a half north of Fort Fisher. There it joined the various detachments from the other ships, all forming four divisions, the marines making the fourth.

The ground between the assaulting party and the fort was without cover, being nothing but sand shelving down to the beach. An intrenching party was sent ahead to dig rifle pits and extend them. Those pits were to have been occupied by the marines who were expected with rifles to keep the parapets clear during the assault by the sailors who were armed with pistols and cutlasses only, and, therefore, prepared merely to scale the parapets and engage in a hand-to-hand confiict.

The idea was for the naval assault to be made on the sea front and northeast parapet at the time when the Army was already engaged in forcing entrance over the northwest parapet. The naval attack within the fort was intended to be chiefly upon the rear of a garrison already engaged.

The sailors who were landed on the beach were from many ships and had never acted together as a unit. Moreover, as the ships were to continue a bombardment that required more accurate firing after the landing than before, the men landed were in large part recruits, the older and steadier men having been retained on board, as a rule.

Besides, the conditions under which the assault was made were not quite those assumed to exist, and also the plan of assault does not seem to have been carried out in several very important particulars.

During the three days' bombardment the ships expended projectiles weighing more than 1,652,638 pounds. It was said that by sunset of the 14th "the fort was reduced to a pulp; every gun was silenced by being injured or covered up with earth so that they would not work."

Certainly a great many guns had been injured, yet as the assaulting party approached the fort it met with such a shower of shell and grape that it was compelled to move by the left flank along the beach, where the slope, especially to those lying down, afforded some little cover. The head of that column soon became very compact and more or less without organization as the various divisions joined and intermingled in the rush of men who, armed with pistols and cutlasses, realized that they would remain defenseless unless the fight became a hand-to-hand one.

It appears that during the assault the rifle pits were not occupied by the marines. It is said that that part of the plan was abandoned under local orders. At any rate the marines were intermingled more or less with the rushing column of sailors on the beach.

The parapets were crowded with the garrison, guns in hand, and a merciless fire was poured into the compact column formed by the assaulting naval forces. That situation was essentially due to two causes. The sailors had landed early in the day and, attacking in the open, made sufficient display to induce the garrison to regard the naval assault as the principal or only one. That for a time left the way relatively clear for the Army to obtain a foothold in the fort and thus reversed the intended order of events more or less. The second cause, of parapets crowded to repel the naval attack, may be found in the circumstance claimed by some that although the naval forces delayed the attack an hour beyond the time when the Army was expected to begin the assault, they really made their rush before the military forces entered the fort.

The taking of the fort was not completed until about 10 p. m., and then only after a very prolonged hand-to-hand conflict. The naval attack certainly facilitated the entrance of the Army, but no part of that naval column ever reached the parapets and, consequently, ever engaged in the hand-to-hand conflict for which it was intended.

There was a line of high palisades along the entire northern face of Fort Fisher that was continued to the ocean, the zigzag continuation barring the gap between fort and ocean. The head of the column, rushing along the beach, came up against those palisades and the obstruction broke the rush of a body of men under a decimating fire. The natural result was that the column broke, some remaining under cover of the palisades until they could effect their escape under the cover of darkness, and the large majority fleeing northward along the beach, seeking shelter from time to time under its crest.

About 1,960 men had been landed from the ships, and the casualties incident to the assault were 79 killed and 254 wounded; total 333, or 17 per cent. There were 4 officers killed in the assault, including Dr. Longshaw, and 15 wounded. Of the 241 who landed from the *Minnesota* there were 8 killed and 25 wounded; total 33, or 13.7 per

cent. Dr. Longshaw was the only officer of the *Minnesota* killed in the assault.

It is not practicable to follow in detail the movements and work of Dr. Longshaw during that assault. The medical journal of the *Minnesota* states that he was killed "under the walls of Fort Fisher." The certificate of death states that the ball entered "the head behind mastoid process."

Lieut. Commander James Parker, executive officer of the *Minnesota*, who was in charge of the landing party from that vessel, made a report of the assault to his commanding officer, Commodore Joseph Lanman, in which the following appears:

> I regret to report the death of Asst. Surg. William Longshaw, Jr. He was always near the front with instruments and tourniquets, and was bending over a wounded and dying man when he was shot in the head and instantly killed. Their bodies were found together after the battle. His bravery was conspicuous, and he nobly discharged the duties of his office.

The entire landing party was under the command of K. R. Breese, fleet captain. In his report of the assault, made to Rear Admiral Porter, there is the following paragraph:

> Of Asst. Surg. William Longshaw special mention should be made on account of his great bravery and attention to the wounded under the hottest fire, until finally he fell a victim in the very act of binding up the wounds of a marine.

In Rear Admiral Porter's report, February 1, 1865, made to the Secretary of the Navy, there is included the following:

> I must not omit to pay a just tribute to the memory of the noble Asst. Surg. William Longshaw, who was shot dead near the enemy's works while engaged in an act of mercy, binding up the wounds of a sailor. * * * They all died like heroes and the Nation is as much bound to mourn their loss as those who have held higher positions. They are all regretted deeply here, and their names will be forever associated with one of the most gallant attacks ever made on a powerful fortress.

But there was also an eyewitness to the heroism of Asst. Surg. Longshaw under the walls of Fort Fisher. That witness was Thomas O. Selfridge, now rear admiral, United States Navy, retired. He was one of those who reached the palisades and remained until darkness facilitated escape. In his account of "The Navy at Fort Fisher," contained in Volume IV, page 661, of "Battles and Leaders of the Civil War," he states as follows:

> While kept under the walls of the fort, I was an eyewitness to an act of heroism on the part of Asst. Surg. William Longshaw, a young officer of the medical staff, whose memory should ever be kept green by his corps, and which deserves more than this passing notice. A sailor, too severely wounded to help himself, had fallen close to the water's edge and with the rising tide would have drowned. Dr. Longshaw, at the peril of his life, went to his assistance and dragged him beyond the incoming tide. At this moment he heard a cry from a wounded marine, one of a small group who, behind a little hillock of sand close to the parapet, kept up a fire upon the enemy. Longshaw ran to

his assistance and while attending to his wounds was shot dead. What made the action of this young officer even more heroic was the fact that on that very day he had received a leave of absence, but had postponed his departure to volunteer for the assault.

If such testimony be considered in close connection with the situation there on the sand before Fort Fisher at the very time the act was performed the conduct of Dr. Longshaw becomes clearly defined as an example of heroism worthy of living for all time in the history of the Navy of the United States. The column had broken, the dead and wounded were strewn on the sand, a few officers and men were huddled under the palisade, and a small group of men was behind a little hillock of sand close to the fort and still keeping up a fire upon the enemy that, guns in hand, crowded the parapet. It was then, in the broad daylight, that Dr. Longshaw moved to and fro across the bare sand, a solitary and shining mark for hundreds of guns a few yards away.

And consider the object, the purpose, of the act and the character and controlling influence of the duty involved—the kind of duty that should give dignity to the medical mind and claim for that mind consideration from every thinking human being, including all in a naval service. Surely education in such duties—the care of the injured and helpless—is of an order as high as any other education in this world, and certainly the circumstances under which that duty was performed by Dr. Longshaw form a brilliant setting for much of the naval medical officer's purpose in life.

Whatever happiness there is in the world, it has arisen from a wish for the welfare of others.

Whatever misery is in the world, it has all arisen from a wish for our own welfare.

On January 16, 1865, the U. S. S. *Fort Jackson* was ordered to "run outside to where the *Minnesota* is lying and take on board the body of Surg. William Longshaw, then proceed without delay to Norfolk, Va."

The body was received at the naval hospital, Norfolk, and sent to Boston, Mass. It now lies in Woodlawn Cemetery, Everett, Mass.

Such is the story of Asst. Surg. William Longshaw, jr., United States Navy. It was said that his name would be forever associated with one of the most gallant attacks ever made. It was said that his name would be forever treasured as an inspiration. But the gift of prophesy is very rare among men. And not only men but the memories of them disappear—as a rule, the dead are soon forgotten.

The name Longshaw is unknown in the Navy to-day. One looks in vain for the *Longshaw* in the list of vessels of the Navy, whose prestige he did so much to maintain. Even his story does not occupy

a place in the minds of the members of the Medical Corps of the Navy—the very corps to which he belonged. He is even there as an unknown.

Surely the rusting iron in mingling with the earth seems to disappear, but in time it tints the rose or courses in the blood of thinker or hero. No substance is ever lost. Material can not be destroyed. It is change, myriads of changes, with never the loss or gain of a single atom, that makes nature's laboratory supremely wonderful.

And may it not be that the higher and much more wonderful immaterial attributes of man also only seem to disappear? Certainly it is difficult to believe that the influence of Dr. Longshaw can ever be lost.

Is it not within the power of the Navy to make the memory of him a living force to-day and for all time? It seems to be a duty the living owe to themselves that his name shall be an inspiration forever.

INTRAPERITONEAL RUPTURE OF THE BLADDER.

By R. B. WILLIAMS, surgeon, United States Navy.

Rupture of the bladder is almost always caused by some external force or violence acting upon this viscus when distended. In pathologic conditions of the bladder wall rupture may occur from simple overdistention or from muscular contraction.

Ruptures of the bladder are of two kinds—extra and intraperitoneal. The latter is by far the commoner, 80 per cent of such injuries being of this variety.

The anterior wall is the part of the bladder more commonly involved.

The treatment of this condition is purely surgical. In intraperitoneal ruptures mortality without operation is practically 100 per cent. In a series of 200 cases quoted by Watson and Cunningham from various sources the mortality following operative interference was 42.2 per cent. Mitchell analyses a series of 90 cases in which the mortality was 83.3 per cent. D. F. Jones has reported an analysis of 54 cases with mortality of 48 per cent, and Horwitz 22 cases with a mortality of 27.5 per cent.

The following figures quoted by Keyes from Mitchell shows the effect upon the mortality of the length of time that has elapsed between the receipt of the injury and operation:

Mortality:	Per cent.
Operation within 12 hours	38.4
Operation 12 to 24 hours	70.0
Operation 24 to 62 hours	72.7
Total mortality	58.8

We will now pass to the history of the patient. Prior to his admission to the naval hospital, J. M., an oiler in the Navy, 63 years of age, was serving on board the receiving ship at the navy yard. On the 14th of March, six days before operation, he was ashore on liberty and drinking heavily. He returned to the receiving ship the next day. He is quite sure that he received no injury or fall during his absence, although the accuracy of this statement is open to grave doubt. It is known on the receiving ship that he continued drinking for several days after his return.

Soon after he was awakened by the bugle call of reveille at 5 o'clock on the morning of March 18 (three days after his return to his ship), he became aware that he had a severe cramping pain in his lower abdomen. He had probably just recovered sufficiently from his spree to appreciate that there was something the matter with him. He got up and attempted to urinate but was unable to do so. The pain steadily increased and toward evening he noticed that his abdomen was swollen. Frequent attempts to urinate were fruitless. On the morning of the 19th he noticed that the abdomen was much more swollen and extremely tender. The pain and distension increased during the day. Repeated attempts with a constant desire to urinate were without avail. At about 3 p. m. he was carried by his shipmates to the ship's hospital, where he was put to bed. At this time he was in great pain, the abdomen was markedly distended, and his general condition was bad. His pulse was 130 and respirations 28 per minute. At 10 p. m. he was catheterized and 200 c. c. of very bloody urine withdrawn. At 1.30 a. m., March 20, his pulse was 160, respirations 30 per minute.

He was admitted to the naval hospital at 2.30 a. m., March 20. His pulse was 140, respirations, 38 per minute, and temperature, 98.4°. He was in a condition of profound shock, and was perspiring freely. His abdomen was enormously distended and there was extreme tenderness over its lower half, with marked rigidity of the recti. The percussion note was tympanitic in the central portions of the abdomen and dull in the flanks. There was movable dullness. No history of any accident or injury could be obtained, nor was there any mark of external violence. The patient was evidently suffering from acute peritonitis with free fluid in the abdominal cavity.

A catheter was passed and a few cubic centimeters of bloody fluid withdrawn. Three hundred cubic centimeters of sterile salt solution was introduced through the catheter and of this only a small proportion returned. There seemed no doubt that we had to deal with an intraperitoneal rupture of the bladder. Blood count showed 15,000 whites with 70 per cent of polymorphonuclears. The patient

absolutely refused operation at this time, but later consented. Operation was begun at 10 a. m.

Operation.—Incision through right rectus from above umbilicus to within 3 or 4 inches of pubes. On opening the peritoneum bloody fluid was projected upward to a distance of 8 to 10 inches. The incision was quickly enlarged and the abdominal cavity mopped dry with gauze. The coils of intestine were much reddened and injected, and everywhere covered with fibrin. On placing the patient in the Trendelenburg position and retracting the intestines, a very much lacerated rupture of the bladder was seen beginning anteriorly almost at the point where the peritoneum passes from the anterior abdominal wall to the bladder and extending over the summit and posterior wall well down into the recto-vesical pounch. The posterior extremity of the rupture could not be seen at this time. On exploring with the fingers, the bladder wound was found to extend posteriorly to within about 2 inches of the vesical orifice of the urethra. The rupture extended from before backward practically in the midline anteriorly, but posteriorly was deflected slightly to the left. The posterior extremity of this laceration extended to within a very short distance of the point at which the peritoneum is reflected from the bladder to the rectum. The extent of the rupture was 5 or 6 inches at the least.

The wound of the bladder was closed by two layers of continuous sutures. The first, of No. 2 catgut, was begun anteriorly and carried through the entire thickness of the bladder wall on either side. When the posterior wall of the bladder was approached the sewing became quite difficult. This was partially overcome by using the suture as a tractor, and when this measure failed, for fear that more forcible traction would break the catgut, the last inch or more of the rent was brought into view by grasping the bladder at the posterior extremity of the suture line with a pair of vulsellum forceps and making vigorous traction.

The through-and-through catgut suture was buried by a continuous Lembert suture of linen, which was begun posteriorly. Especial care was taken to cover in the lacerations made by the vulsellum forceps. At the beginning of the operation an infusion of salt solution in the pectoral region was begun and continued throughout its course. Of this solution 1.500 c. c. was injected.

When the suturing was completed two large gauze wicks were introduced down into the recto-vesical space. These drains covered the suture line. A retention catheter was introduced into the bladder through the urethra, and the abdominal wound closed in layers. The patient's condition was much better at the close of the operation than at its beginning. Time of operation was about two hours or a little less.

Recovery was comparatively uneventful. The cigarette drains were first changed on the sixth day. The catheter was removed on the eighth day. On the fourteenth day there was a rise of temperature to 102.6°, with the physical signs of pleurisy in right lower chest. The temperature subsided gradually and the physical signs slowly cleared up. No fluid was obtained on exploring with the needle. The urine up to this time and later was very purulent. The bladder was irrigated through a catheter twice a day and 20 grains of urotropin and sodium benzoate given thrice daily. The urine showed a mixed infection of bacillus and coccus, probably the colon bacillus and the staphylococcus albus. An autogenous vaccine was made from the urine and of this 75,000,000 bacteria were injected on the 27th day with a marked cutaneous and systemic reaction. (Temperature 103.2°.) This was the highest post-operative temperature. The condition of the urine steadily improved following the injection of the vaccine. Three weeks later, on the 47th day the urine still being slightly purulent, 150,000,000 of the same vaccine was given with marked local and very slight general reaction. Five days later a third injection of 200,000,000 of the autogenous vaccine was given with a very slight local and no general reaction. At this time the urine showed only a few cocci. The urine is now clear—no albumen or pus cells microscopically. A culture taken on May 19 shows no growth.

In reviewing this case it seems probable that the rupture occurred on March 14, when this man was on temporary leave of absence from the receiving ship, and was too much under the influence of liquor to appreciate that he had been injured, and further, that he did not begin to appreciate his condition until he had sobered up on the morning of March 18. If this assumption is correct, six days had elapsed between the time of his injury and operation. The enormous amount of fluid in the abdominal cavity would of itself seem to indicate that a very considerable period of time had elapsed between injury and operation, and that the above assumption is more or less accurate. If we assume that the rupture was spontaneous from overdistention it evidently occurred prior to 5 o'clock a. m., March 18. As the operation was done at 10 a. m., March 20, this assumption gives us a period of 53 hours between rupture and operation.

A point of interest in the case is that the method of suturing the bladder through all its coats does not seem to have produced any ill effects, although it is generally advised to avoid the mucous membrane. Of course, it is possible that calculus may form upon unabsorbed parts of the through-and-through sutures at some future date.

Another interesting point is the manner in which the autogenous vaccine cleared up an extremely purulent urine.

NITROUS OXIDE-OXYGEN ANESTHESIA.

Rebreathing method of administration in general surgery at the United States Naval Hospital, Norfolk, Va.

By H. F. STRINE, surgeon, United States Navy.

In the October, 1912, number of the United States Naval Medical Bulletin a preliminary report was made on nitrous oxide-oxygen anesthesia as used at this hospital. Since May 1912, this anesthetic has been employed in practically all surgical work performed in the general operating room, except in those cases involving the head and neck. The number and character of the operations, we believe, establish the claim previously made that nitrous oxide-oxygen administered by the rebreathing method is the simplest and safest anesthetic thus far devised.

The ideal anesthetic will probably never be discovered, since any means that produces unconsciousness and loss of sensation by inhibiting or depressing the vital centers must always be managed with the greatest care. Perfect safety with no after effects, loss of sensation with good relaxation, and simplicity of administration are the three requirements of an ideal anesthetic.

A frequent remark made by visiting surgeons after observing the ease and rapidity with which patients are anesthetized, the satisfactory relaxation, the good color maintained, and the prompt recovery, has been that the anesthesia was perfect, but that we have an expert anesthetist. An experienced surgeon recently made this remark after observing three laparotomies. In this case the expert anesthetist was a hospital steward, inexperienced in the administration of chloroform or ether, who had previously given gas in less than a dozen cases. In 14 months' experience with nitrous oxide-oxygen anesthesia we have had four regular anesthetists. The change in each case was made on the detachment, illness, or absence of the regular anesthetist. At present there are in the hospital three experienced gas anesthetists. Naval hospitals differ from civil hospitals in this respect that the personnel of the Hospital Corps is constantly changing. From the nature of service conditions our hospitals must be in a sense training stations, consequently a permanent anesthetist is out of the question.

The junior medical officers in our hospitals need all the practical surgical experience possible. Our regular anesthetist should be a selected hospital steward—selected in the sense that an anesthetist must be a man interested in his work, intelligent, and possessing self confidence.

The advantages of nitrous oxide-oxygen anesthesia are fairly well known. There is no dread of the anesthetic, and all sensations are

pleasant. The rapidity and ease with which unconsciousness and recovery occur is striking. Irritation to the kidneys and respiratory tract is absent, and there is no toxic aftereffect. An operation can be performed with comparative safety where ether would be a very grave risk. Four cases in our number of administrations of nitrous oxide-oxygen may be cited:

(1) Abscess of kidney. Patient extremely emaciated and septic; pulse 120; persistent vomiting. Nephrectomy was performed; no postoperative nausea or vomiting.

(2) An infected, distended gall bladder in a man aged 53; weight, 176. Complicated by a severe attack of acute bronchitis. Cholecystostomy was performed; cystic duct blocked with stones.

(3) Multilocular abscess of kidney, which had been previously drained in hope of improving his general condition. The septic condition continued, and a very large, densely adherent kidney was removed.

(4) Gangrenous appendix removed. Patient suffering from acute bronchitis and chronic nephritis.

Our records in 1,000 consecutive cases of ether anesthesia showed 10 per cent of annoying postoperative irritative effects, with one-third of 1 per cent deaths from lung or kidney complications. This possibly does not exceed the average ether damage. With nitrous oxide-oxygen anesthesia in over 450 administrations for operations, which would otherwise have received ether, there has been no death and apparently no irritation or toxic aftereffects. A few patients complained of severe headache.

In the rebreathing method, properly managed, the patient's color is good; cyanosis is not essential to good anesthesia—the oxygen cylinder is attached to the apparatus to prevent it. Deep cyanosis means carelessness or improper manipulation. Cyanosis is very apt to occur in chronic alcholics, but we have seen no harm come from it.

Ether necessary for relaxation: No effort has been made to force nitrous oxide-oxygen at this hospital. Early in our experience we were convinced that ether in small quantities had little or no effect in producing relaxation, interfered with regular breathing, and complicated manipulation. It was decided to remove the ether cup from the apparatus and give gas; if necessary, shift the anesthetic. However, this has seldom been necessary.

For deep abdominal work, the soft muscle relaxation of ether and chloroform is not obtained. Weak, emaciated, or septic patients relax well; strong muscular patients and old alcoholics, as a rule, do not. In the latter class of cases, work on the stomach, gall ducts, or ureters requires ether or chloroform. Laparotomies, where the intestines are greatly distended, require great care and patience

on the part both of the operator and the assistants in opening and closing the abdominal cavity. The extra work is worth while for the patient's safety and comfort after he is returned to bed. However, we are here discussing a comparatively small percentage of cases; the vast majority of abdominal operations is not so urgent but that the distension can be relieved beforehand. If from the nature of the condition distension can not be relieved and further relaxation be required, the face mask should be changed to the ether cone at once.

The same preparation of the patient for nitrous oxide-oxygen anesthesia should be made as for any other general anesthetic; the stomach empty and the bowels thoroughly evacuated. We give an injection of morphine sulphate, gr. 1/6 to gr. 1/4 in all cases one-half hour before the patient is taken to the operating room. Morphine is necessary to insure good, smooth anesthesia, and it lessens the immediate postoperative pain, since the patient promptly regains consciousness when the mask is removed.

Technique of administration: A man who undertakes to administer nitrous oxide-oxygen should, if possible, have had experience with ether or chloroform and be trained to observe his patient constantly. Quite recently we had our first experience in what may happen with improper manipulation of the apparatus. A new anesthetist was being trained. In course of the operation he overfilled the rebreathing rubber bag so that the patient was expiring against pressure, cyanosis appeared and oxygen was added, further distending the bag. The patient stopped breathing and became deeply cyanosed, the pulse remaining strong. The face mask was removed, and a few artificial movements of the chest restored normal breathing. The anesthetic was then resumed. A few days later we had the same experience. Too much or too little gas in the bag interferes with full expiration or inspiration and embarrasses respiration.

The following points are essential to nitrous oxide-oxygen administration:

(1) An uncomplicated rebreathing apparatus, such as the Gatch nitrous oxide-oxygen-ether apparatus, with the ether cup detached.

(2) Morphine with atropine given at least one-half hour before administration.

(3) The face mask must fit air tight and the valve box manipulate without admitting air.

(4) Oxygen given only when the patient becomes slightly cyanosed, and then admitted in *small* quantities until the color clears. The period of rebreathing and the quantity of oxygen required depends on the individual. Herein lies the secret of efficient administration.

(5) The operating surgeon should remember that the patient's safety and postoperative comfort well repay him for a little extra work and patience in performing the operation. An impatient surgeon who insists on complete muscle relaxation will be disappointed with gas anesthesia for abdominal work.

No chloroform, ether, or local anesthetic was used in the following cases:

Operations performed under the influence of nitrous oxide-oxygen anesthesia.

Character of operation.	Number.	Deaths.	Remarks.
Resection of pylorus with 1 inch of duodenum and ⅓ of stomach, gastroenterostomy.	1	0	No postoperative vomiting.
Posterior gastroenterostomy	2	0	Do.
Thyroidectomy, 1 lobe removed	2	0	(1) simple hypertrophy; (2) cystic degeneration.
Complete intestinal obstruction (ileum) by broad band of adhesions at root of mesentery, enormous distension.	1	0	No postoperative vomiting.
Nephrectomy	2	0	(1) Pyonephritis; (2) multilocular abscess, secondary operation.
Cholecystostomy	2	0	(1) Infected gall bladder, cystic duct blocked with stones; (2) stone in common duct.
Transplantation of omentum, ascites	1	0	Cirrhosis of liver.
Laparotomies in general, appendectomies, etc.	131	0	The appendectomies represent practically every condition and position in which the appendix is found.
Herniotomies—inguinal, ventral, and umbilical.	108	0	
Hemorrhoidectomies	35	0	The sphincter was thoroughly dilated in all except 4 of these cases.
Operations—general	183	0	Operations of a trivial nature are performed in dressing rooms under local anesthesia.
Total	469	0	

LEUKEMIA, WITH REPORT OF A CASE OF THE LYMPHATIC TYPE.

By H. L. Kelley, passed assistant surgeon, United States Navy.

This malady is defined as an affection characterized by permanent increase in the white blood corpuscles, associated with hyperplasia of the leucoblastic tissues. (Osler, Practice, 1912.)

History.—Janeway (Ref. Handbook of the Med. Sci., 1902, Vol. V.) writes that this unusual and interesting disease was first described in 1845 by Hughes Bennett, and independently a few weeks later by Virchow. In Bennett's case it was observed that there were cells in the blood which "exactly resembled pus cells." Virchow decided that these cells were not pus cells but the white blood cells increased many times their normal number. The latter inclined to the view that there was some definite relation between the enlarged spleen and the diseased condition of the blood.

In reviewing an older case of Rokitansky's, which had been diagnosticated "general pyemia," Virchow correlated it with his own case and proposed the name leukemia, or white blood, for the disease.

Several new cases were reported and some older cases were brought to light and a series of articles followed. Virchow early described

a case differing from all the others in presenting marked enlargement of the lymphatic glands throughout the body, accompanied by an increase of the small and not of the large white blood cells. This he named "lymphatic leukemia," calling the previously described disease "splenic leukemia."

Since the work of Virchow, various observers have from time to time added a little to the knowledge of the disease. Ehrlich's studies in staining, the recognition of acute leukemia by Ebstein and the study of its blood changes by Fränkel, and Neumann's work, in 1870, on the rôle of the bone marrow in the pathology of leukemia, have been perhaps the most notable.

The older writers distinguish two forms of leukemia, as given by Virchow, on the basis of their gross anatomical features: 1. The splenic type, in which the spleen is enormously enlarged; 2. The lymphatic type, with somewhat enlarged spleen, but with general enlargement of the lymphatic glands. Later, when Neumann demonstrated the constant presence of a characteristic change in the bone marrow in the splenic cases, these were called spleno-myelogenous, the term still most frequently used. Since that time it has been found that certain marrow changes are fairly constant in lymphatic leukemia, and some cases of leukemia with no anatomical changes outside of the bone marrow have been reported. Acute forms of either type, with many variations, are recognized.

The investigation and classification of the leucocytes, since the pioneer work of Ehrlich, have led to many changes in the theories as to their derivation. The part that the spleen is known to play in their origin is very small. The bone marrow and lymphoid tissues have proved to be the great centers of leucocyte proliferation, and the distribution of lymphoid tissue has been found to be wide, areas of it existing even in the bone marrow itself.

Etiology.—Little is known of the conditions under which the disease arises. (Osler, 1912.) Malaria is believed, by some, to be an etiological factor, especially in the spleno-myelogenous form. Osler states that of 150 cases analyzed by Gowers there was a history of malaria in 30, and nearly every writer mentions malaria as a possible cause.

Ziegler (Zeit. f. klin. Med. LXII, Nos. 1 and 2) analyzes 33 cases of chronic myeloid leukemia, among which 4 cases seemed to have developed following contusions to the spleen. Other cases are reported following scarlet fever or other infectious diseases. Several writers (Berl. klin. Woch. July 3, 1911, XLIII, No. 27) report 3 cases of lymphatic leukemia in X-ray workers and one in a chemist working with radium. Stengel (Prog. Med. June, 1912, Vol. II) regards these cases as somewhat analogous to the skin cancers caused by X-rays and as a further argument for considering leukemia as

neoplastic. He states that no absolute distinction can be drawn between leukemia and sarcoma. (Banti, Whartin, and others.)

From the records it appears that the disease is more common in America than in other countries. The myelogenous form is more common than the lympathic.

Age.—The disease is more frequent in the third to sixth decades of life, but may occur in infants as early as the eighth or tenth week, or it may occur as late as the seventieth year. The chronic form of lymphatic leukemia is apt to occur later than other forms. Males are more prone to the disease than females. In a few cases there seems to be a family tendency.

Morbid anatomy.—The wasting may be extreme, dropsy is often present. There may be ecchymosis in different parts.

In the spleno-medullary form the spleen is greatly enlarged, the weight may range from 2 to 18 pounds. The organ is in a condition of chronic hyperplasia. It cuts with resistance, is of reddish brown color and grayish-white, circumscribed lymphoid tumors may occur in the organ. There is extraordinary hyperplasia of the red marrow, the medulla of the long bones may resemble the core of an abscess. Histologically there are found in the medulla, large numbers of nucleated red blood cells in all stages of development. There are also many large cells with a single large nucleus and neutrophilic granules, the myelocytes of the blood. The liver is usually increased in size.

In the lymphatic form there is general lymphatic enlargement, which is usually associated with a certain amount of enlargement of the spleen, and the cervical, axillary, mesenteric, and inguinal groups of glands may be much enlarged. The bone marrow may be replaced by a lymphoid tissue. Nucleated red corpuscles and normal marrow elements may be greatly reduced. The liver may be enlarged and the enlargement is usually due to a diffuse lymphatic infiltration.

Symptoms.—The onset in either form is insidious. The patient usually seeks advice for the enlargement of the abdomen, shortness of breath, the enlarged glands, pallor, palpitation, or other symptoms of anemia. Some of the subjects may look healthy and well until very seriously ill.

Almost any symptom may be present; the disease may resemble an acute infection or a malignant growth.

Fever is usually present to some degree, especially in the acute forms, but varies. The tendency to hemorrhage is marked, the common points being from the nose, gums, stomach, or intestines. Sometimes hematuria may be seen.

As in all chronic diseases, digestive disturbance is the rule; anorexia, emesis, and constipation are frequent. Emaciation is a constant feature of the disease.

In acute lymphatic leukemia the onset may be more sudden than in the splenomyelogenous form, fever being more severe and constant, and the whole course of the disease may cover only a few days, but usually lasts five or six weeks or longer.

Diagnosis.—The clinical picture may be so involved with that of other conditions that the microscopical examination of the blood is sometimes the only reliable means of making a diagnosis.

The blood picture may vary greatly with treatment or during an attack of an intercurrent affection. Leukemia should never be confounded with leucocytosis, in which the increase is of the polymorphonuclear cells, while in leukemia of either type the mononuclear forms predominate, and the diagnosis between the two types depends on the predominating type of mononuclear elements.

Prognosis.—Janeway (Ref. Hand. of the Med. Sci., 1902) states that in either form the termination is invariably fatal. Later reports, however, are more favorable. (Prog. Med., 1913, June.)

The outlook of the myelogenous form is, as a rule, more favorable to a prolonged course than it is in the lymphatic variety. Acute leukemia may be expected to kill within three months: the chronic form may last for several years.

As regards deductions to be drawn from the symptoms as to the probable duration of the disease and the present condition of the patient only a few general statements are possible. The best guides are the extent of the emaciation and failure of strength and the condition of the digestion and circulation. The total number of leucocytes, the actual size of the spleen or of the lymphatic glands is of minor importance, but increase of these is a sign of advancing disease. The converse is not necessarily true, but is more favorable.

Rapid or progressive fall of the red-blood cells, large hemorrhages, dropsy, or intercurrent infection is of serious import.

Treatment.—The most popular treatment for leukemia is exposure to the Röntgen ray, which seems to be more effective in the myelogenous form. In many cases the life of the patient is prolonged and the improvement is often so marked as to cause patients to feel that they are cured. Thomas (Cleveland Med. Jour., April, 1912) states that, under favorable conditions, the patient may be restored to comparative health in a few weeks, and his length of life increased from three to six years.

Removal of the spleen is marked by improvement in some cases, but more often a fatal result follows. Arsenic is recommended by many writers when indicated by a stationary leucocyte count or a decided anemia.

Larrabee (Amer. Ther. Soc., May, 1911) reports 18 cases treated with the mixed toxins of Coley. The results were negative in cases

of lymphatic leukemia, but improvement was the rule in the myelogenous form.

Karanyi (Berl. klin. Woch., July 15, 1912), Karalyfi (Wein. klin. Woch., Aug. 29, 1912), and Stein (Wein. klin. Woch., Dec. 5, 1912) report several cases with marked improvement from the use of benzol. They prescribe it in capsules or mixed with olive oil, one-half gram of each per dose at first; this may be increased even up to 5 grams per day. They state that previous X-ray treatment seems to render the patient more readily responsive to the action of the drug.

They report a rapid drop in the number of the white blood cells and diminution in the size of the spleen, the lymph nodes seem to be less influenced, but the general improvement in most cases is remarkable. The majority of the cases treated were of the chronic myelogenous type, but in one case of lmyphatic leukemia the improvement was very rapid; this latter case had received X-ray treatment previously.

Blood examinations should be made frequently, especially leucocyte counts, and if the X-ray is used the treatment should be continued as long as myelocytes are present. Frequent differential counts are of great value in estimating progress.

The following case is considered of interest because of the comparative rarity of the disease, especially in the Service, and because of certain departures from typical leukemia in symptoms, history, and post-mortem lesions:

The patient, an officer in the Navy, age 40 years, was admitted to the naval hospital, Washington, D. C., in December, 1912, with the following history:

Family history.—Father died at 66 years from some stomach trouble which he had had for some time. Mother died at 60 years. Patient has three brothers and one sister living and well.

Past history.—Patient has never been sick much since childhood until during the past year. Moderate user of alcoholics. Denies any venereal infection. In January or February, 1912, he noticed a beginning enlargement of the abdomen, with gradual increase in size, especially on the left side, until September, 1912, when a splenectomy was done at the Johns Hopkins Hospital. Had night sweats frequently up to the time of the splenectomy, also had frequent diarrhea, both of which were relieved after the operation; he denies ever having had dysentery. At times, prior to operation, he was deeply jaundiced, he became progressively weaker and had greater difficulty in breathing. All symptoms and signs of trouble, except the weakness, were relieved until some time in November, when the abdomen began to increase in size again and patient's respiration became more embarrassed.

Present illness.—Upon admission patient complained of weakness, constipation, and shortness of breath upon exertion. When lying on left side he felt pain and oppression, as if something were pulling from the right side. For a month has had some swelling of the abdomen, with edema of the thighs and recently of the scrotum and penis. Has lost some weight.

Physical examination.—Fairly well nourished. Chest thin, with retraction of interspaces during inspiration. Heart not enlarged and sounds appear normal. Temperature, pulse, and respiration normal. Left lung seems normal except for retraction of interspaces during inspiration. Right lung shows diminished expansion and retraction of interspaces as on the left side. Hyper-resonance over parasternal area from second to fifth rib. Dullness begins at fifth interspace, mamillary line, extends downward and to axilla, and changes position when patient is turned on left side. Dullness in the back from angle of scapula fifth interspace downward. Vocal fremitus diminished right side of chest, front and back over dull area. Vocal sounds diminished below fifth interspace in the back. Liver dullness begins higher than normal and extends about 7 cm. below the costal border. Edge of liver seems to be very firm and smooth. Abdomen distended, with a dome of tympany about the umbilicus, and dullness beginning about 8 cm. from the umbilicus and extending into the flanks. Percussion wave is transmitted to the opposite side, and dome of tympany shifts somewhat with change of position.

Lymphatic glands in both groins somewhat enlarged but not markedly so, glands palpable in axilla and neck. Some edema of thighs, legs, scrotum, and penis, this edema increasing with sitting up or standing for any length of time.

Blood pressure 120 cm. systolic, 90 cm. diastolic in prone position.

Progress of disease.—From the time of admission, constipation and distension with gas were constantly recurring symptoms, and, at times, were most obstinate of treatment, but when relieved caused temporary comfort, which sometimes lasted for three or four days.

The abdomen was tapped several times when the increasing fluid would begin to cause dyspnoea and discomfort. January 1, 1913, 1,500 c. c. were obtained.

Fluid contained: Fat, 0.35 per cent; total proteid, 0.77 per cent; albumin, 0.35 per cent; nucleoproteid, 0.22 per cent; globulin, 0.13 per cent; total solids, 3.18 per cent; total nitrogen, 0.35 per cent; sugar, urea, and ammonia, of each a trace.

Fluid was turbid and of a yellowish color, no free fat globules after centrifuging, treatment with acetic acid and heating shows fatty acid.

Fluid entirely cleared by precipitation out of the globulin with saturated solution of ammonium sulphate. Cell sediment shows red cells, few polymorphonuclears, and many lymphocytes. Endothelial cells are present. Another cell is present in which the cytoplasm is deeply staining similar to Türck's irritation cell; many of these cells show from two to six nuclei.

Fluid, 4.250 c. c., obtained on January 24, 1913, shows: Globulin 0.825 per cent; serum albumin, 0.165 per cent; nucleoproteid, 0.165 per cent; specific gravity, 1.012. Reaction slightly alkaline.

Cell sediment much as in previous examination. Lymphocytes predominate, but cells of the large mononuclear type are somewhat increased over the last examination and many show two or more nuclei. Endothelial cells in considerable numbers are present.

Fluid, 250 c. c., obtained on February 11, 1913, showed: Globulin, 0.900 per cent; serum albumin, 0.25 per cent; nucleoproteid, 0.25 per cent; specific gravity, 1.012. Reaction slightly alkaline.

Cell sediment as in previous examination. Small lymphocytes predominate. Endothelial cells and large mononuclears are present.

On February 15 he was suffering so much discomfort from distension of the intestines with gas that it seemed that there must be an ileus, and it was decided to open the abdomen to relieve the condition if possible. An incision was made in the right semilunar line. a large unestimated amount of fluid escaped, and the patient was greatly relieved. Continuous drainage was established and in the five days following amounted to 4,050 c. c., beside a large amount into the dressings, which were changed twice daily. This fluid seemed to have some digesting effect on the skin, which had to be carefully watched.

The right chest was tapped on January 24, 1913, and 300 c. c. of fluid, similar in appearance to the ascitic fluid, was obtained. Examinations of the right chest after this showed more normal findings.

Blood.—Three red counts on different days averaged 4,600,000. Hemoglobin, 90-100 per cent. White count showed as follows:

	Dec. 5, 1912.	Dec. 20, 1912.	Jan. 21, 1913.	Feb. 12, 1913.
	Per cent.	*Per cent.*	*Per cent.*	
Polymorphonuclears	20	28	42.0	....
Small lymphocytes	71	60	43.5	....
Mononuclears and transitionals	4	8	4.0	(1)
Eosinophiles	3	3	2.0	....
Mast	1	1	.5	....
Myelocytes	1	....	....	....
Rieder cells	Present	....	....	....
Total	18,000	17,500	17,500	21,000

[1] Differential count not made.

Note the relative increase in polymorphonuclears and the decrease in small lymphocytes. No nucleated red cells were found.

Feces, normal. Urine usually contained a small amount of albumin and several times a few hyaline or granular casts.

Patient's condition became progressively worse, although his appetite remained good until a few days before death. No gastric symptoms. The bowels usually began to be distended in the afternoon and increased until relieved by active catharsis. Patient was never comfortable on the left side because of the weight of the liver.

The superficial veins of the chest and abdomen became quite dilated and tortuous and gave the idea of the presence of a malignant growth. There was no history of epistaxis until during the last week when it occurred several times during the night. Edema of the legs and thighs would appear when the ascites was increased.

Treatment was X-ray and Fowler's solution and otherwise as indicated.

Patient died February 20, 1912, with symptoms of uremia, a little less than two months after admission, and practically a year after the first appearance of symptoms.

The following history was obtained from Johns Hopkins and was essentially the same as that obtained here, with some little difference in the blood picture. He was admitted September 6, 1912, and was carried under the diagnosis of "Splenomegaly, primary." A splenectomy was done September 11 and the recovery from the operation was without notable complications.

An abstract of the blood examination shows: White blood cells, 3,000 to 9,000.

Differential counts.	Aug. 30, 1912.	Oct. 6, 1912.	Oct. 9, 1912.
	Per cent.	*Per cent.*	*Per cent.*
Polymorphonuclears	52	46.0	54.0
Lymphocytes	36	42.0	32.5
Mononuclears and transitionals	8	11.5	12.5
Eosinophiles		0.5	1.0
Hemoglobin	70–75		

From the physical examination it is to be noted that the skin was rather deeply pigmented over the exposed parts. All cervical glands were enlarged, as well as the axillary, epitrochlear, and inguinal glands.

Abdomen was very prominent, most marked on the left side. A large mass, probably the spleen, extends 17 cm. below the left costal border. Area of liver dullness is increased, begins at the fifth rib and extends to a point 9 cm. below costal margin. No definite shifting dullness.

At operation the spleen was removed through a T-shaped incision; the spleen was very large (weight not given), the surface was slightly roughened, and the organ was of a pale yellowish color. There were a number of enlarged, rather soft, friable glands about

the hilus of the spleen and large glands thickly distributed in the root of the mesentery. The liver was large and appeared rather fatty. On the concave surface of the liver there was a superficial white nodule less than 0.5 cm. in diameter which looked smooth like the nodules in the spleen.

Pathological report.—On a gland excised from axilla for diagnosis. "Chronic lymphadenitis. No evidence of Hodgkin's disease, lympho-sarcoma, or tuberculosis. Leukemia could not be excluded from the section." There was no pathological report on the spleen.

After the operation the patient improved gradually. Drains were removed on the seventh day and the bowels began to move normally, and the patient was discharged from the hospital on October 12, 1912, considerably improved in general health.

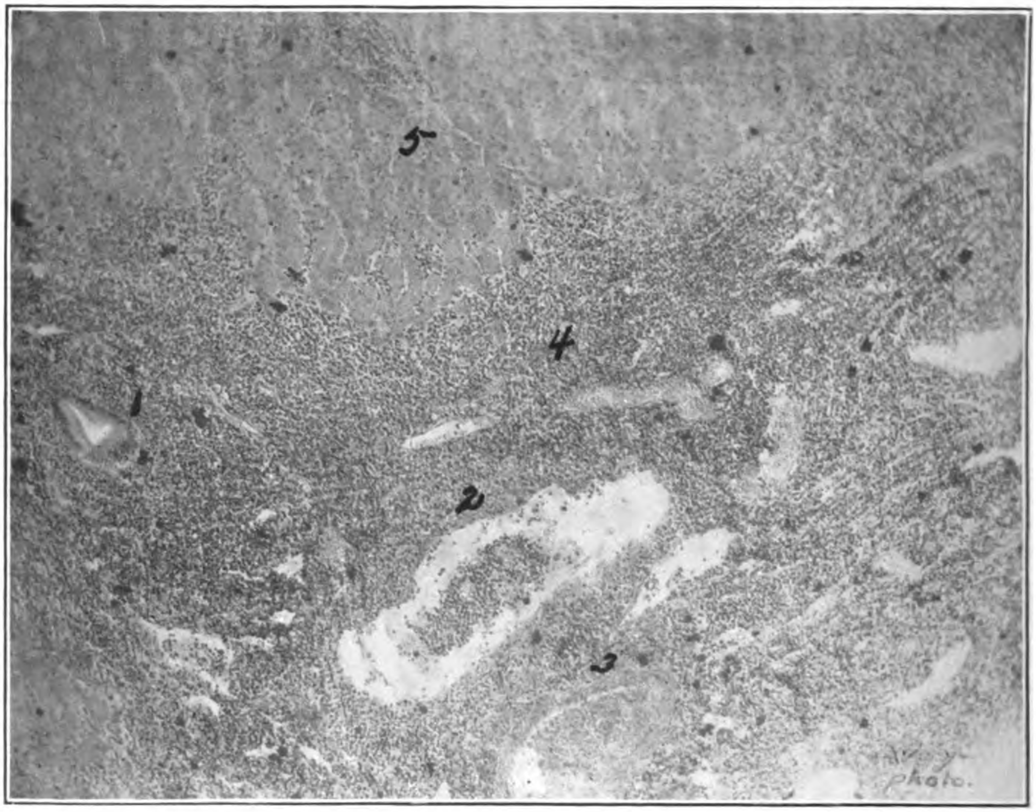
Autopsy.—Abdomen greatly distended and tympanitic, on the right side to the anterior axillary line, on the left side to the mid-axillary line. On removing the sternum several large glands were found adherent to its under surface. Left pleural cavity contained 450 c. c. of straw-colored fluid. Left lung was adherent at the apex, and upon resection the apex showed several calcareous cicatrices. Right pleural cavity contained 1,250 c. c. chyliform fluid. Right lung was edematous in lower lobe. Heart flabby and not enlarged. The lymphatic glands at the bifurcation of the trachea and on the right side of the trachea were enlarged and formed a chain.

Abdominal cavity.—Liver adherent over left lobe at the site of scar from the splenectomy. Liver weighed 2,980 grams. Upon section firm and cuts with considerable resistance. Cut surface very pale, almost like tallow interspersed with occasional small areas showing liver brown color. External surface, light yellow in color, slightly rough, with occasional nodular masses the size of a large bean. Spleen had been removed at a previous operation. The omentum was adherent to the left parietal peritoneum, binding down the colon about the site of the splenic flexure. The other parts of the large intestines, normal. Kidneys, normal in size and no abnormality except passive congestion noted. Pancreas apparently normal; the head was surrounded by a mass of enlarged lymphatic glands. Retroperitoneal and mesenteric glands greatly enlarged and matted around the aorta and vena cava in the lumbar region, and must have accounted for some of the edema of the legs and abdomen.

Microscopical report.—Liver: Widespread infiltration of lymphocytes, particularly in the periportal areas. (Liver of lymphatic leukemia.)

Spleen: Infiltrated with lymphocytes. Specimen obtained from Johns Hopkins.

Kidney: Passive congestion and some parenchymatous degeneration, practically normal.



1, BILE DUCT; 2, VEIN; 3, ARTERY; 4, LYMPHOCYTES; 5, LIVER TISSUE.

Mesenteric glands: Hyperplasia.

Lung: Left apex, tuberculosis; right base, atelectasis—passive congestion.

Résumé.—A search of the literature on lymphatic leukemia shows few cases of a similar nature. The leukocytosis in this disease is usually much higher, even to 500,000 cells per c. mm. The comparatively low leucocyte count, the constant high hemoglobin per cent, and comparatively normal red count in this case is rather remarkable.

It is to be noted that the temperature remained normal throughout the course of the diseases.

It is stated that the superficial lymph glands are the ones most frequently involved, but in this case practically the only glands which were markedly enlarged were those matted together about the large abdominal vessels, a location not commonly noted in the literature at hand. Again, the most frequent cases of lymphatic leukemia occur in younger persons, and are usually associated with fever.

Regarding the content of the ascitic or pleuritic fluid, no reports of cases have been found in which an analysis had been made, although it is stated that fluid may be found in the pleural or abdominal cavities, or even a general anascara may be present.

The diagnosis in this case rests largely on the interpretation of the blood picture and the pathological findings, rather than upon any reliance on the clinical picture presented, and a definite diagnosis could hardly have been made ante mortem.

In looking over the literature on the subject, the writer is impressed with the great confusion existing between lymphatic leukemia, lymphadenoma, lymphosarcoma, psuedo-leukemia, Hodgkin's disease, and several somewhat similar diseases.

Thanks are due to Dr. Finney for data from Johns Hopkins and to Drs. Stitt and Clark, of the Naval Medical School, for reports on fluids and tissues. The microphotograph of liver tissue was made by Hospital Apprentice (first class) Avery, United States Navy.

THE HOSPITAL CORPS.

A synopsis of the records, reports, and correspondence in reference to the Hospital Corps, United States Navy.

By G. A. Riker, passed assistant surgeon, United States Navy.

At present the Hospital Corps numbers about 1,250, divided into the ratings of hospital steward (about 290), hospital apprentice, first class (about 500), and the remainder being made up of hospital apprentices. This number is about 300 short of the number required to properly fill the complements of the ships and shore stations of the Navy with its present strength. The greatest deficiency is in

the rating of hospital apprentice, first class, as about 750 of this class are required.

When men enlist as hospital apprentices, they are transferred to one of the several training stations and are given the same training as apprentice seaman except that stretcher drills and first-aid instruction are substituted for small-arms practice and artillery drills. In the course of three or four months they are reported as having completed the course and recommendation is made for their transfer to some ship, where they are allowed to remain from six months to one year, depending on the number of men available for their relief and other service conditions, before being transferrd to a hospital, with a view to completing the course of instruction that was begun on the ship, thus fitting them for advancement to a higher rating.

It is expected that hospital apprentices will be prepared for an acting appointment as hospital apprentice, first class, at the end of one year and for a permanent appointment in that rating at the end of two years. Hospital apprentices, first class, having held a permanent appointment for one year are eligible to take the examination for an acting appointment as hospital steward, but it is noted that few men are sufficiently well prepared to pass this examination before the end of their first enlistment, as there is considerable difference between the requirements for hospital apprentice, first class, and those for hospital steward.

Hospital apprentices having passed the examination for hospital steward are placed on the eligible list and are given an acting appointment as hospital steward as soon as their services may be required, and upon the completion of one year of satisfactory service in the rating with an acting appointment a permanent appointment as hospital steward may be applied for.

The grade of pharmacist, for which a competitive examination is held when vacancies exist, is the next promotion to which Hospital Corps men are eligible. The examination is open to all hospital stewards of 10 years' service in that rating, and the appointment to fill the vacancy is awarded to the applicant passing the examination with the highest general average. Pharmacists are eligible to promotion to chief pharmacist after serving six years in the grade of pharmacist. The total number of pharmacists and chief pharmacists is limited, according to a recent decision of the department, to 25.

THE RECORDS.

Upon receipt of an examination report, Hospital Corps, United States Navy, recording the enlistment of a man in the Hospital Corps, an envelope is made out to carry the man's record during his

entire service in the Hospital Corps. On the outside of this jacket is noted the man's name, place and time of enlistment, the ratings held, and transfers to the several ships and stations, with the date of transfer. All reports of examination and fitness, together with copies of all official correspondence and requests for duty, are filed in this jacket in order to keep as complete a record of the man's entire service as possible. In conjunction with the above record, two card-index systems are in use, one showing the men on duty at the different shore stations and on ships, and the other showing the date of expiration of enlistment of all Hospital Corps men in chronological order. Upon the discharge of a Hospital Corps man for any reason his jacket, together with the two index cards, is placed in the dead files and kept there for future reference, or in the event of reenlistment is returned to its place in the active files.

REPORTS.

There are but five reports which intimately concern the records of Hospital Corps men:

1. Examination report, Hospital Corps, United States Navy.
2. Efficiency report, United States Naval Hospital Corps.
3. Form "K."
4. Weekly or monthly personal memorandum to the Surgeon General.
5. Mailing card showing transfer of Hospital Corps men.

Examination report, Hospital Corps, United States Navy, is to be forwarded on the following occasions:

(1) All original enlistments in the Hospital Corps.

(2) All requests for change of rating to the Hospital Corps, together with the request, the commanding officer's recommendation, and Form 1B (Nav.).

(3) All promotions to hospital apprentice, first class (acting appointment), with the statement of the commanding officer that an acting appointment has been issued.

(4) All cases where a permanent appointment as hospital apprentice, first class, is recommended, together with Form 1B (Nav.).

(5) All examinations for the rating of hospital steward (acting appointment). In these instances marks are to be awarded for aptitude for the service in the higher rating, practical and oral work only. The examination report is then forwarded with the man's request for examination, approved by the commanding officer, and accompanied with a letter from the medical officer under whom the applicant has been serving, Form 1B (Nav.), and the written examination. These papers are marked in the Bureau of Medicine and Surgery, and should the aggregate mark be sufficient to qualify the candidate, his name is placed on the eligible list for an acting ap-

pointment as hospital steward and he is recommended for such appointment as soon as his services are needed.

(6) All recommendations for permanent appointment as hospital steward. In these cases the written examination is not forwarded to the bureau for review, the marks for the entire examination being awarded by the examining board. The examination report is forwarded with the applicant's request for a permanent appointment, showing the commanding officer's recommendation and Form 1B (Nav.).

EFFICIENCY REPORT, UNITED STATES NAVAL HOSPITAL CORPS.

The importance of this report can not be magnified too greatly, as this is the only official information upon which the bureau can rely when recommending men for certain type of special duty. This report is to be forwarded in all cases of transfer and discharge of Hospital Corps men.

FORM K AND THE PERSONAL MEMORANDUM FOR THE SURGEON GENERAL.

Little need be mentioned of these reports, the former merely having a list of the Hospital Corps men on duty during the quarter reported, and the latter being forwarded from training stations and hospitals reporting the list of men on duty and their specified duties, together with a report of any transfers. These reports are all checked with the files in the bureau.

MAILING CARDS, REPORT OF TRANSFER OF HOSPITAL CORPS MEN, N. M. S. 125682.

This report was instituted for the purpose of obtaining information of all transfers and discharges at the earliest possible time in order that vacancies could be filled more promptly and to keep a better check on the bureau files, as occasionally Hospital Corps men would be invalided from the service or declared deserters and the information would not reach the bureau for several weeks or months after the vacancy had been created.

REQUESTS.

All official requests are copied and placed on file in the jackets of the men making them, and if the exigencies of the service permit, and the applicant has a creditable record, they are given favorable consideration.

The following requests do not receive favorable consideration for the reasons mentioned:

(1) Duty at a specified station or ship in the Asiatic, as these details are all made by the commander in chief, United States Asiatic

Fleet, the Bureau of Medicine and Surgery only making recommendation for the transfer of the required number of men to the Asiatic Station.

(2) Requests for recruiting duty from hospital apprentices, first class, in their first enlistment, as it is not deemed advisable to recommend men for this duty until they have completed one enlistment. Men will not be considered favorably for this duty unless their records are beyond reproach. Hospital apprentices and hospital stewards are not available for recruiting duty.

(3) Requests necessitating a considerable expense for mileage, especially when the station asked for is some distance from the point of enlistment or when there is but a short time remaining in the current enlistment.

In conclusion, the writer may add that all information influencing the record of a Hospital Corps man in any way is carefully filed for future reference, and every medical officer should do his utmost to cooperate with the bureau by forwarding such information, thereby joining forces in an endeavor to increase the efficiency of the Hospital Corps with a view of attaining the highest possible standard.

VERU MONTANITIS.

By H. W. Cole, passed assistant surgeon, United States Navy.

Literature on diseases of and symptoms produced by pathologic conditions in the veru montanum is not voluminous, and textbook information is difficult to obtain on this subject. Therefore a few remarks on this part of the genito-urinary tract may not be amiss.

Anatomy (Gray): The veru montanum is found in the prostatic portion of the urethra. Upon the floor of the prostatic urethra is a narrow longitudinal ridge, the crest of the urethra, formed by an elevation of the mucous membrane and subjacent tissue. This crest begins at the uvula vesicæ and passes through the prostatic portion into the membranous portion of the urethra and usually bifurcates at its distal end. It contains muscular and erectile fibers. On this longitudinal ridge, in the prostatic urethra, is found an enlargement called the veru montanum, or caput gallinaginis. On each side of the veru is a fossa, the floor of which is perforated with numerous apertures, the orifices of the prostatic ducts from the lateral lobes of the prostate. At the forepart of the veru, in the mid line, is a narrow slit, the prostatic utricle or sinus pocularis, and on or within its margin are the openings of the ejaculatory ducts from the seminal vesicles. The utricle forms a cul-de-sac about a quarter of an inch in length and runs upward and backward in the substance of the prostate gland be-

hind the transverse band of tissue which binds the two lateral lobes behind the posterior wall of the urethra. The prominent anterior wall of the utricle forms the veru montanum. When distended the veru prevents the passage of semen back into the bladder. Its walls are composed of fibrous tissue, muscular fibers, and mucous membrane, and numerous small glands open on its inner surface. It is developed from the united lower ends of the atrophied Müllerian ducts and is therefore homologous with the uterus and vagina in the female.

PHYSIOLOGY: The secretion from the vasa deferentia and seminal vesicles mixes with that from the prostate gland in the sinus pocularis. If the ejaculatory ducts open on the margin of the sinus pocularis instead of within its margin, the seminal secretion joins that of the other glands of reproduction in the urethra, and not in the sinus pocularis. The veru montanum by distension prevents the back flow of semen into the bladder. Normally the prostatic urethra is sensitive, and is especially so when the veru is inflamed, though this holds true when the prostate alone is inflamed. The passage of an instrument through this part of the urethra of a patient of nervous temperament is not only attended by pain, but ofttimes by shock. The patient becomes pale, nauseated, and may even faint on the table, but more frequently after getting on his feet. Urethral shock, neuralgia, and spasms may be caused by the passage of an instrument over an inflamed veru montanum.

CAUSES: Veru montanitis is usually gonorrheal in origin, though any infection may produce it. Tumefaction and fibrosis may also be causes. All neoplasms of the urethral tract are rare, but when occurring, are found almost exclusively in those who have had gonorrhea. Congestion due to unsatisfied sexual desire is a frequent cause, as is also masturbation, though the latter may be a result of veru montanitis rather than a cause, in which case it is probably central in origin. Small prostatic calculi may appear in the utricle and by pressure or encystment give rise to an inflammation of the veru. Small urinary calculi by lodgement may act in the same way.

SYMPTOMS: Excessive nightly emissions which are due to congestion, and painful erections due to the same cause, are frequent symptoms. The penis frequently becomes flaccid during coitus and the patient complains of "losing his manhood." This is possibly a reflex neurotic condition due either to inflammation of the veru montanum, or to masturbation, or to both. Painful urination referred to the head of the penis should always cause suspicion of trouble in the veru. There is also pain of a burning, tickling sensation in the scrotum, the posterior urethra, and especially over the symphysis pubis, which you do not get in a case of prostatitis, though symptoms of veru montanitis may of course be concomitant with any line of symptoms

which an associated prostatitis would produce. Practically every prostatitis is associated with an attendant veru montanitis, which latter may or may not present symptoms. Inflammations of the posterior urethra and veru montanum when occurring with a chronic prostatitis almost invariably have associated with them an acute or chronic inflammation of the trigonum vesicae. This gives rise to marked symptoms of frequency of urination and dysuria. A number of cases of what have been considered to be inflammations of the veru montanum are in reality due ofttimes to inflammations of the mucous membrane lining the walls of the sinus pocularis, or to a collection of degenerated polymorphonuclears and epithelial cells, forming a mucoid mass or plug which partly or wholly fills the lumen. These plugs may become very large, themselves causing a mild obstruction to circulation with consequent congestion. They may even become very hard, causing symptoms of pain, pressure, and irritation by their bulk.

Diagnosis: This is usually made by endoscopic examination, though pain on urination referred to the head of the penis, pain over the symphysis pubis, painful erections, painful and unsuccessful coitus, excessive nightly emissions, and a chronic morning urethral discharge, should always suggest an examination of the veru montanum. The endoscopic picture is one of enlargement, redness, and inflammation of the veru montanum. The orifice of the utricle may be inflamed, swollen, or may present a small calculus. The same is true of the utricle itself. Both orifice and utricle may, and often do, contain small ulcers. Frequently small yellowish pin-point spots are also seen.

It will probably be well to describe here the armamentarium for urethroscopy and the preparation of the patient. Either a posterior urethral endoscope with prostatic curve, or a straight tube, or both should be at hand. Young's urethroscope with external illuminator and attachment for air distension is undoubtedly the instrument of choice. The particular advantages of this urethroscope are that the external illuminator is attached to a post, allowing rotation, and thus giving more or less light and at the same time more room for the introduction of instruments; also by rotating the outer part of the instrument the light swings out of the way and it is possible to introduce cotton swabs, and various instruments without touching the outer attachments and thus preserving excellent asepsis. Various small probes for utricular exploration, intra-urethral rongeur and scissors for biting or clipping portions of hypertrophied or inflamed veru montana or urethral or vesical polyps, cauteries of different shapes, a porte caustique for carrying small cones of nitrate of silver, small curettes, cotton swabs on wooden sticks the length and size of an ordinary knitting needle, Geraghty's utricle syringe, and an

ordinary penis bulb syringe will complete the outfit. All of these instruments can be boiled except the external illuminator. The cotton swabs must be carefully sterilized in glass jars or tubes and a sufficient supply always kept on hand.

The patient is placed on the table with feet in stirrups and thighs elevated, or better still, with rests underneath the knee joints, thighs slightly elevated, and legs hanging down over the knee rests. The penis, especially the glans, prepuce and coronal sulcus, the scrotum and pubes are thoroughly cleansed with tincture of green soap and warm water and then carefully washed in a 1 to 1,000 solution of bichloride of mecury. The urethra is then thoroughly cleansed by irrigating it with plain sterile water. This is best done by retracting the prepuce behind the glans and grasping the root of the penis between the ring and little fingers of the left hand, while the glans is held between the thumb and index finger of the same hand. With the right hand the tip of the irrigating nozzle is introduced into the meatus.. By alternately forcing in the tip of the nozzle and then retracting it, an almost constant flow is maintained and a thorough cleansing of the urethra accomplished. The operator should be equally careful with the sterilization of his hands, green soap and water, then Harrington's solution and bichloride of mercury 1 to 1,000 being usually used. In addition I prefer the use of sterile rubber gloves, as they serve as a valuable adjunct to asepsis and prevent slight electrical shocks which sometimes occur from faulty connections. A sterile towel, especially made, about 13 inches square and pierced in the center by a slit 2½ inches long, is placed over the genitalia, the penis being drawn through the slit. With the prepuce retracted the penis is held as described above in the technique for irrigating the urethra. With the right hand, the tip of the sterile glass penis syringe filled with sterile 4 per cent solution of either cocaine or novacaine, is introduced into the meatus and the contents of the syringe forced into the urethra. The tip of the syringe is withdrawn, the meatus being held closed between the thumb and index fingers of the left hand to prevent leakage of the cocaine. The fingers and thumb of the right hand encircle the body of the penis and the cocaine is forced downward by squeezing the penis with each finger in succession from above downward. This procedure is repeated for several minutes. The same technique is employed in injecting the sterile glycerine, which should now be forced into the urethra. The urethroscope is now passed in much the same way as a sound, into the prostatic urethra and the veru montanum located. The field is then dried by withdrawing any fluid that may be present, by means of the bulb syringe. The field is further rendered dry by introducing one of the cotton swabs and mopping the area dry of any small quantity of fluid remaining.

The great importance of asepsis throughout can not be too strongly emphasized.

TREATMENT: First, be sure that the veru montanum is at fault, for the prostate is often treated when the veru montanum is really the seat of the trouble. After the introduction of the urethroscope into the prostatic urethra the first thing is to get the field of the veru montanum dry and clean. This is best accomplished by drawing out any fluid that may be present with a bulb syringe and subsequently mopping the field with one of the small sterile cotton swabs. A small probe should be introduced into the orifice of the utricle and the lips separated in order to view the utricle. If the utricle is inflamed it should be irrigated or catheterized, using a 1 or 2 per cent solution of nitrate of silver in a utricle syringe. Care must be taken not to pass the end of the syringe more than a centimeter into the utricle on account of the danger of going into the ejaculatory ducts and the probability of causing subsequent seminal vesiculitis or epididymitis. The effect of this treatment is often remarkable. In the first place it usually brings on the pains which the patient has previously complained of and generally after sexual intercourse, reproducing them so that the patient can often recognize them. It is often followed by a severe reaction, frequent urination, and sometimes even obstruction to urination, probably owing to the dilatation of the utricle and consequent urethral obstruction. But usually there is very rapidly a complete relief from all the symptoms of which the patient has complained. This treatment may be repeated at subsequent endoscopies, but as a rule it is not necessary to do it more than three or four times, usually at intervals of several weeks. Should a small stone present in the orifice or be seen in the utricle it can be removed, often with the rongeur, or if too large for delivery, the orifice is slit up with the scissors and the stone removed.

After the utricle has been attended to, then of course the exterior should be taken care of. If there is considerable enlargement, swelling, or irregularity, the use of the urethral rongeur is an excellent thing and a large part of the outer surface can be clipped off by successive bites of the small rongeur, and then the curette will complete the work, thoroughly denuding and reducing in size the veru montanum. The silver nitrate stick can now be applied to the whole exterior so as to get a good cauterization. These little silver nitrate pencils are especially molded to fit the small applicator which is used through the urethroscopic tube. After such a treatment it is best to let the patient wait 10 days, taking urotropin gr. vii t. i. d. all the time. Then begin prostatic massage and give this for a week or two at intervals of three or four days. Then another urethroscopic treatment should be given. After two or three thoroughly radical treat-

ments have been given the veru montanum should be allowed to rest for a considerable period, during which time the patient should be observed and possibly treated by prostatic massage and intravesical irrigations of nitrate of silver 1 to 7,000 forced in by hydrostatic pressure without the use of a catheter. Possibly hot rectal douches, electricity to the rectum by means of a high-frequency current, or the same current applied to the whole urethra through a glass tube, or directly to the veru montanum through a copper electrode may be beneficial. If the patient does not improve or recover after the above treatment has been given a fair trial the condition is probably one of psychasthenia, in which case rest in bed, diet, cold baths, massage, and electricity (general), is the course of treatment indicated.

The author wishes to express his indebtedness to Prof. H. H. Young and to Dr. H. W. Plaggemeyer, of Johns Hopkins Hospital, for valuable assistance in the preparation of this article and for clinical instruction obtained from them.

TESTS FOR COLOR BLINDNESS.

By G. B. Trible, passed assistant surgeon, United States Navy.

Color blindness has always been a potent factor in marine disasters. Among the historical instances in which it was the known cause may be cited the cases of collision between the *Lumberman* and the *Isaac Bell*, the *City of Austria* in the harbor of Fernandina, the case of the Spanish man-of-war *Marinero*, and the loss of the *Teresa*. In more recent times there has been the collision of the *Primus* and the *Hansa*. Many other accidents, hitherto reported "cause unknown," could doubtlessly be explained in this manner. Until recently witnesses in investigation of these occurrences were not examined for color perception, so that often their testimony was of doubtful value. With the higher rate of speed, recognition of lights and signals must be done more promptly in order to avoid accident.

Objections have always been raised to any and all forms of tests for color vision, and the ideal has not been reached. There is great difficulty in approximating natural conditions, and another difficulty lies in determining the dividing line between the dangerous and the nondangerous cases of deficient color perception. If all were excluded who showed deficient color perception by the most delicate and scientific examinations, such as by the spectrometer or the anomaloscope, it is likely that close to 20 per cent would be found unfit. On the other hand, it has been repeatedly found that the markedly color blind have passed Holmgren's and other tests based

on that principle, and that those not color blind have failed. About 50 per cent of the cases who failed Holmgren's, given by the local examiners, have been passed on appeal and reexamination by the British Board of Trade. Contrariwise, 5 per cent who had passed Holmgren's failed when examined by Nagel's, about the same percentage as that of failure by Holmgren, so that Holmgren passed as many color blind as it detected. Stargardt says "Ganz zuverwerfen ist das Holmgrenische." Its use has practically disappeared in Germany, though the Young-Helmholtz theory of color perception, upon which this test is based, is held by a majority.

No matter which theory of color vision is accepted, for practical purposes in the service the following requirements are imperative: (1) That there be no confusion between red and green lights. (2) That red be not confused with white. (3) That green be not confused with white. (4) That the red rays from the extreme red end of the spectrum be perceived, i. e., no shortening of the red end of the spectrum. These rays are the most penetrating, and are seen first. (5) That those be rejected who are unable to distinguish red, green, and white at normal distance, or who are unable to distinguish red, green, and white when the illumination is reduced. This would exclude those with defective central color perception and those with insensitive retinas. Under natural conditions in fogs, rains, or clouds lights are reduced in brilliancy. These conditions can not be met with the woolens alone. The efficiency of Holmgren's can be increased by the addition of a yellow or orange test skein, and the substitution of a dark brown for the present deep red. The one under examination should be required to put the woolens selected in a closed receptable. In this way he is not able to judge by luminosity so readily.

The methods most in favor with recent writers in Germany are Stilling's test, with the pseudo isochromatic plates, Nagel's test cards, Cohn's test (black circles upon red background; when they are covered with thin paper the rings appear green, and the normal sighted can easily tell where the gaps are). The anomaloscope is recommended as the final test. In England the Edridge-Green color perception lamp has very strong support, and for practical purposes, for simplicity, accuracy, and general serviceability has not yet been excelled. If a man can pass this test he is fit for the service, whether or not he passes Holmgren's or other tests. It possesses seven colored glasses and seven modifying glasses and has six apertures, three large and three small. The third size is of the greatest utility, the smaller sizes represent a 5½-inch railway signal light at 600, 800 and 1,000 yards, respectively.

The colored glasses are:	The modifying glasses are:
1. Red A.	7. Ground glass.
1. Red B.	8. Ribbed glass.
2. Yellow.	9. Neutrals.
3. Green.	10. Neutrals.
4. Signal green.	11. Neutrals.
5. Blue.	12. Neutrals.
6. Purple.	13. Neutrals.

With this lamp the candidate is seated at a distance (15 to 20 feet), preferably in a darkened room. The largest aperture with the plain colored glass is used first; gross errors will be shown by this with one revolution. Usually it is necessary to use the third size and the modifying glasses. Rarely are the smaller sizes used at this hospital except to test the central color perception. In this test the miscalling of the blue and purple is not considered of serious import, but one who confuses red and green, red or green with white, or who is unable to perceive the red, should be rejected. The phenomena of simultaneous or successive contrast are more marked for the color-blind than the normal, and this can be used in the way described by Edridge-Green, using the reds two or three times in succession, then turning to the yellow, the color deficient will call it green, while to the normal sighted it will be unchanged; or using the green several times in succession then turning to the yellow it will be called red. This last fault does not seem to be so important, since it will occur with these who otherwise seem perfectly normal. Any color can be made by combination, but, as a rule, the first findings, made after 10 minutes or so, should be taken.

The question of the origin of color blindness has frequently arisen in the case of a man taken into the service and passing successfully when examined each enlistment, and in the case of midshipmen, each year, and then who fails, for example, on coming up for reenlistment or promotion, it would seem that either acquired color blindness is more common than supposed, or that there has been an errror in the tests, unless the condition is temporary. Temporary color blindness can be produced by various causes, according to recent writers: toxemias, exposure to strong light or bright colors, and exhaustion are causes. Also disturbance of the color center, though this center has not been definitely located and its very existence is to a certain extent incompatible with the Young-Helmholtz theory, causes pathological color sensations, such as are seen in the psychoses and diseases of the nervous apparatus of the eye. The chromatopsias, red, blue, or green vision, or the appearance of color spots would come under this category. Destruction or partial destruction of the color

center, due to brain tumors, brain abscesses, or depressed fracture, would cause a disturbance of the color sense. The existence of other than temporary color defect with the possession of normal vision would indicate congenital color blindness, and the mere fact of its late discovery would not mean that it only recently occurred; it would mean a previous failure to diagnose it. The addition of Stilling's pseudo isochromatic plates and Nagel's cards to recruiting officers or traveling parties, with the continuance of the modified Holmgren, and the installation of the Eldridge-Green color-perception lamp in hospitals and hospital ships, would exclude the dangerously color-blind and would enable accurate study and investigation of those cases who really developed color blindness after periods of service. At present there must exist a strong suspicion that they already had it but escaped detection.

For scientific study a spectrometer so arranged as to show limited fields, and which would give the wave length of the rays, is necessary. With an instrument of this nature the position and extent of the neutral band can be studied. Doubtful cases and those suspected of malingering could be detected more easily. With the usual tests malingering may often be suspected, but is difficult to prove. Color deficient cases do not necessarily make the same error continuously in matching tests; it depends directly upon the illumination; so if one under examination fails to make the same error on different examinations it merely shows that he is not sure of what he sees and matches or names the colors as they appear to him.

The condition of color fatigue has not been thoroughly worked out or under what circumstances it would appear in nature. By fatiguing a normal eye with green and with red Abney found that spectral rays about S. S. N. 40.1 which appeared bluish green to the normal eye appeared to the eye fatigued by green as white, slightly blue, about the result in one green blind. Fatiguing with red changed the normal red orange at S. S. N. 53.3 to pale yellow green. Artificial color fatigue was produced by Burch by employing a burning glass of 2-inch focus, filling the pupil with direct rays of the sun, after passing through a ruby glass backed with a magenta stained film. To produce green fatigue he used three thicknesses of green glass colored with cupric oxide. The part color fatigue or temporary color blindness plays in the service remains to be worked out. In cases in which these conditions are suspected a delay in the examination of a few days with rest of the eyes would be all that would be necessary. It would seem unlikely that these factors would be of much import unless under most extraordinary conditions, such as prolonged watches, exposure to searchlights, or other brilliant illumination.

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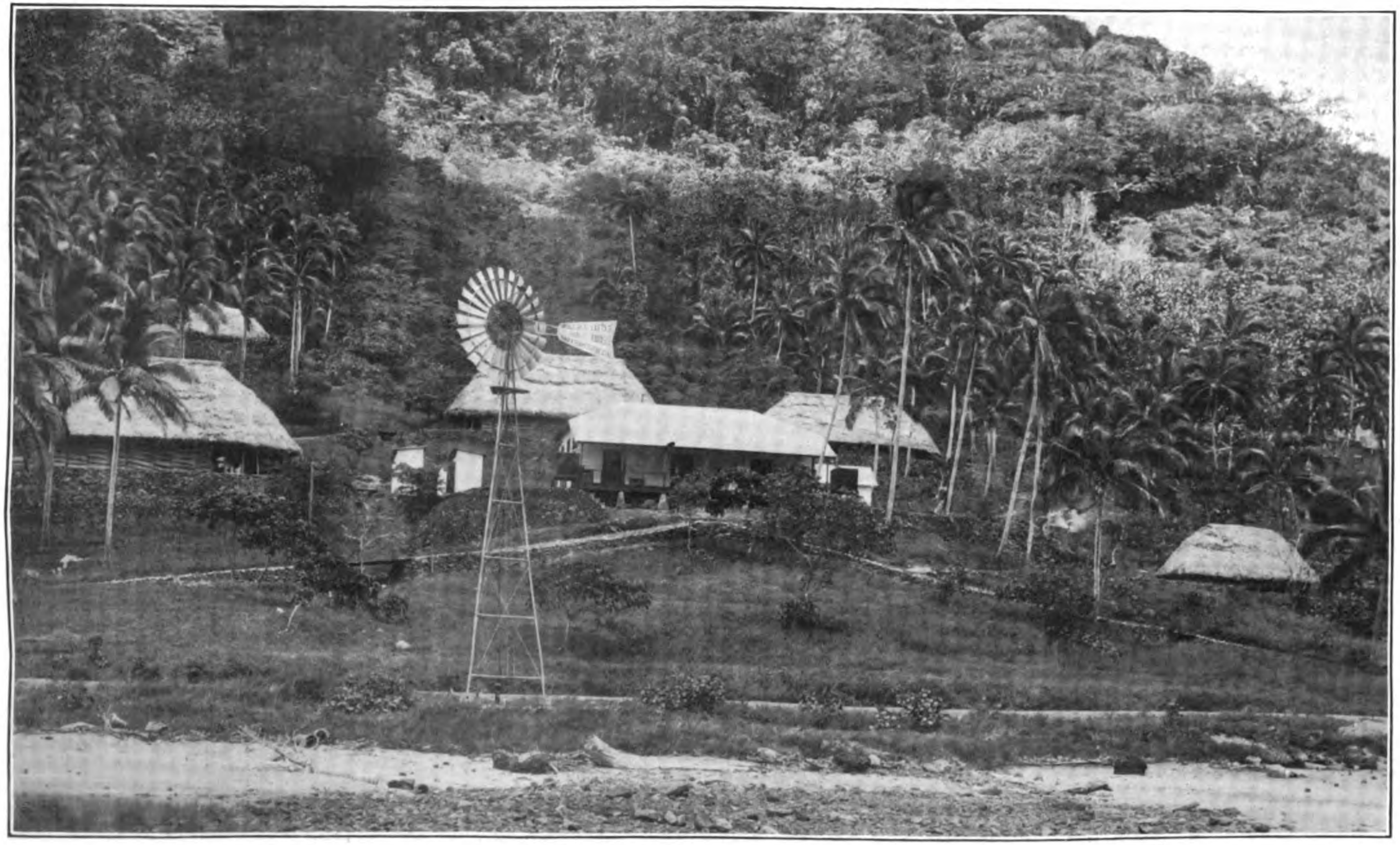
MEDICAL WORK IN AMERICAN SAMOA.

By E. U. REED, passed assistant surgeon, United States Navy.

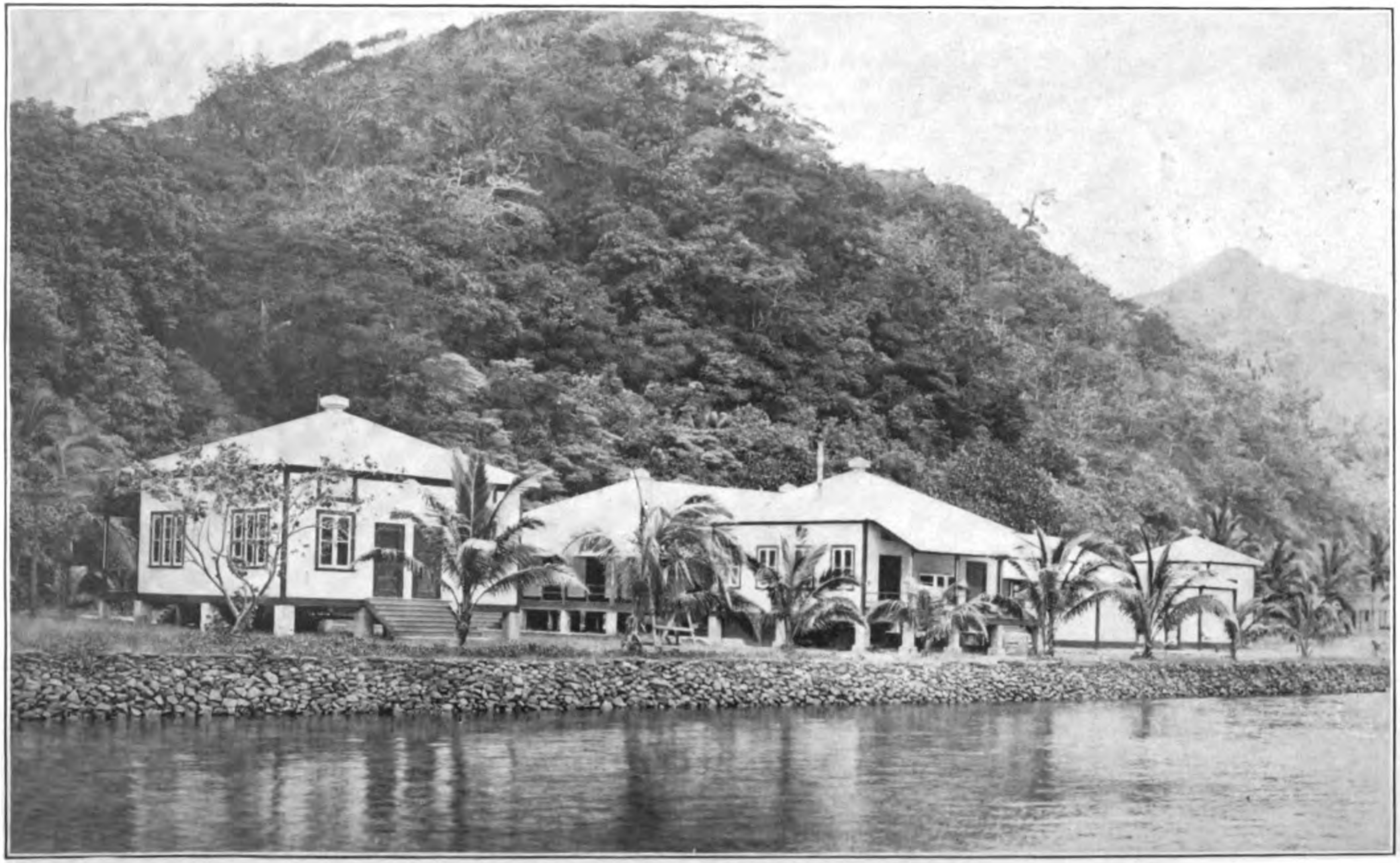
The senior medical officer of the naval station, Tutuila, Samoa, in addition to the care of the naval personnel and management of the naval dispensary and sick quarters, performs the duties of health officer of American Samoa. These duties consist of: Management of the Samoan hospital, care of the Samoan sick, charge of the Samoan hospital fund, and prevention of disease. The health officer is chairman of the board of health.

MANAGEMENT OF THE SAMOAN HOSPITAL.—The Samoan hospital, planned by Asst. Surg. G. F. Cottle, United States Navy, and constructed during my own tour of duty (Sept. 1, 1911, to May 1, 1913), is located on Government land west of the naval station and about a half mile from the naval dispensary. It consists of a central frame building of three rooms, with adjoining kitchen, storeroom, latrine, and shower baths (constructed by the civil government); three large and three small Samoan houses (one of each constructed by each of the three districts of American Samoa), and an operating room, recently erected by labor furnished by the civil government and material purchased by the Samoan hospital fund. The central building contains a dressing room, a dispensary and laboratory, and an examining room. A 12-foot veranda extends along the entire front of the building. The Samoan houses are used as wards. The large ones are 28 by 60 feet and the small ones 20 by 32 feet. They are well constructed and have concrete floors. The operating room is 16 feet square with concrete floor and tile border. It has four large windows and an amber skylight, and is much better adapted to the climate than the operating room at the naval dispensary.

Fresh water is collected from the corrugated iron roofs in three 400-gallon tanks, and water for bathing and flushing is collected in a 10,000-gallon tank, into which it flows from a spring above the hospital or is pumped from the bay by windmill during prolonged dry weather.



SAMOAN HOSPITAL.



NAVAL DISPENSARY

Garbage is collected in covered metal cans and burned in an efficient little crematory constructed from a condemned stove covered with cement and provided with a section of tile pipe for a flue, a few fire bricks and a section of old grate in the oven. It faces toward the prevailing winds, and air for draft is admitted under the oven door.

The buildings and roads are lighted by electricity from the station power plant, and flowers and trees have been planted, including some royal palms from Honolulu, which will eventually make the grounds very attractive.

Prior to March 4, 1912, the Samoan sick were treated in part of the old naval dispensary and in two small Samoan houses in its rear. At that time the central frame building and one large Samoan house had been nearly completed and the patients were removed to the present establishment.

The personnel at the Samoan hospital at the present time consists of 1 hospital apprentice, first-class; 1 hospital apprentice (Samoan), 3 Samoan apprentice seamen (enlisted for hospital duty), 1 civilian employee acting as nurse and interpreter, and 1 as caretaker. A female nurse (caste) was employed during the greater part of this period and rendered very valuable assistance. Several other Samoan women have been taken for training as nurses, but none of them proved satisfactory.

Care of the Samoan Sick.—The population of American Samoa is 7,251, of whom 6,659 are Samoans, 121 Pacific islanders, 292 castes, and 179 whites (census of 1912). In 1911, 360 deaths and 258 births were reported. The deaths reported in 1912 numbered 88 and the births 168. This great difference in death rate was due in large measure to the serious measles epidemic of 1911.

During the 20 months covered by this report 7,288 sick days were recorded in the Samoan hospital; a daily average of over 12 patients. Four clinics a week were held and an average of 245 persons have been examined and treated and 475 surgical dressings applied each month. Two thousand two hundred and ninety-four laboratory examinations were recorded, including blood, urine, feces, sputum, pus, cultures, and rats (for plague.)

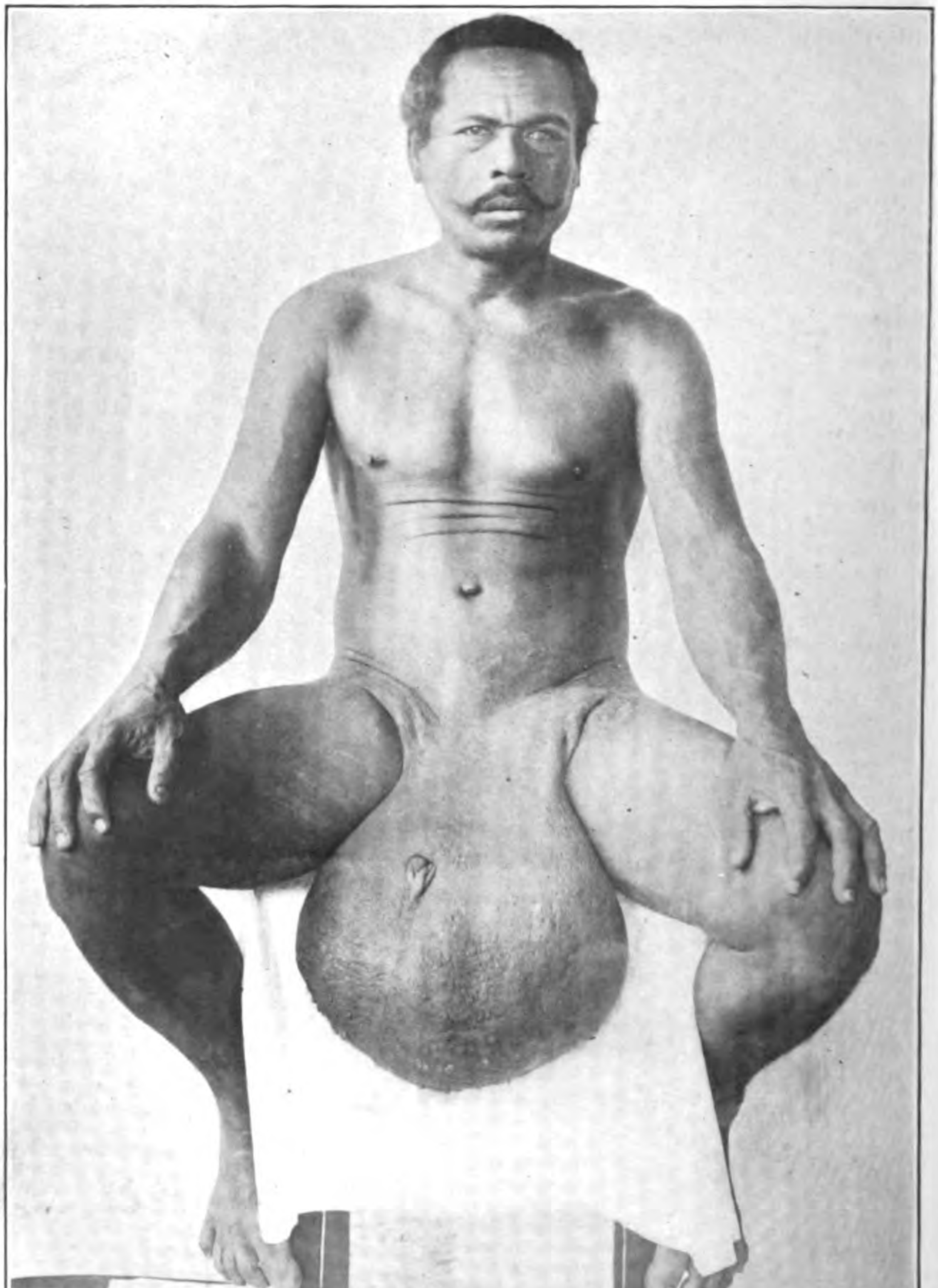
A total of 362 operations (including those on the naval personnel) were performed; 279 under general anesthesia. Abscesses formed the bulk of the minor operations, many of them resulting from filarial irritation of the tissues and subsequent infection. The major operations included the following:

Abortion, incomplete, dilatation and curettage	1
Abscess, chronic mediastinal, sections of sternum and ribs removed	1
broad ligament, puerperal, associated acute appendicitis, appendectomy, salpingectomy, and drainage	1
pelvis, extraperitoneal drainage	2
psoas, tubercular, drainage	1

Acute epidemic jaundice, exploratory, gall bladder drained	1
Adenitis, cervical, tubular, excision	3
Appendicitis, acute	2
chronic, interval operation	4
Carcinoma, cæcum, inoperable, exploratory	1
ilium, excision of 18 inches	1
pylorus and stomach, Billroth's operation	1
Chorionepithelioma, producing abortion, dilatation, enucleation, and curettage	1
Cyst, splenic, drained	1
right tube and broad ligament, removal and ventrofixation	1
tubo-ovarian, with adherent, retroflexed uterus and contracted cervix, removal, ventrosuspension, dilatation, and curettage	1
Duodenal ulcers, severe hemorrhage, Mayo's posterior gastroenterostomy	1
Dysmenorrhea, dilatation and curettage	1
Eclampsia and incomplete miscarriage, rapid evacuation of uterus	1
Elephantiasis of male genitals, excision of elephantoid tissue	52
with herniotomy and excision	4
Enchondroma of foot, excised	1
Endometritis following abortion, dilatation and curettage	1
Epididymitis, acute gonorrheal, Hagner's operation	1
Fracture, frontal depressed, trephined	1
inferior maxilla, ununited, wired	1
ulna and radius, compound suppurating, drained and splinted	1
Fibroids, uterine, with large ventral hernia, hysteromyomectomy and repair of hernia	1
Hernia, inguinal, herniotomy, 1 under cocaine, 4 more recorded with elephantiasis	7
Jaundice, acute, exploratory laparotomy	1
Laceration, perineum, with endometritis, dilatation, curettage, and Emmet's repair	1
cervix, perineum and sphincter, trachelorrhaphy and Emmet's repair	1
perineum with retroflexed uterus, dilatation, curettage, and Emmet's repair	1
perineum with prolapsed uterus, Emmet's repair	1
cervix and perineum, trachelorrhaphy and Emmet's repair	1
perineum with descendens uteri, Alexander operation and Emmet's repair	1
Mastoiditis, chronic tubercular, curetted and packed	1
acute purulent, curetted and packed	1
Miscarriage, incomplete, with sepsis, dilatation, curettage, irrigation, and packing	1
with hemorrhoids, dilatation, curettage, and removal of hemorrhoids	1
Pyosalpinx and appendicitis, appendectomy and drainage of abscess	1
Salpingitis, appendicitis and adherent retroflexed uterus, appendectomy, salpingectomy, and ventrosuspension	1
Salpingitis and endometritis, appendectomy, salpingectomy, dilatation, and curettage	1
Varicocele, Bloodgood's operation	2

Of the 352 operations, one case died of shock (after Billroth's operation), one of peritonitis (from puerperal sepsis), one of eclamp-

ELEPHANTIASIS AND LIPOMA.



ELEPHANTIASIS.

sia (uterus evacuated), one of Weil's disease (after drainage of gall bladder); two cases of elephantiasis, one of hernia and one of hernia complicated by elephantiasis recurred; one case of inoperable carcinoma and one of chronic tubercular mastoiditis were unimproved and the remaining cases were cured or much improved.

With one or two exceptions, chloroform has been used in all the more serious operations and ethyl chloride as a general anesthetic in many of the shorter ones.

The most prevalent diseases have been dengue, filariasis, and elephantiasis, tuberculosis, framboesia, ucinariasis, ascaridiasis, Samoan conjunctivitis and its sequelæ, typhoid fever, and dysentery. No cases of measles have been observed since September 1, 1911. My observations indicate that most of the deaths among adults since the measles epidemic have been due to tuberculosis, cancer, filariasis and deep filarial abscesses, and dysentery. Several diseases are frequently combined; the resistance of a very high percentage of the population having been lowered by intestinal parasitic and filarial infections. A large proportion of the deaths occur in children during the first 12 months. Samoan women begin to feed their babies with bananas, taro, and breadfruit at a ridiculously early age and wean them much too soon. Malnutrition, intestinal parasites, bronchitis, and Samoan treatments often combine to produce a fatal result.

"Devil doctoring" is still practiced quite extensively. Three deaths in the Samoan hospital during 1912 were attributed to Samoan treatments. The difficulty of obtaining conviction of practitioners (usually old women), under the existing laws is very great and it has been impracticable to investigate the deaths in remote villages or to enforce the prompt reporting of deaths in these islands. It is stated on good authority that the custom of giving remedies, sometimes poisonous, to drive out devils was introduced from Fiji about 20 years ago. The devil doctors are greatly feared by the majority of Samoans, and presents of fine mats, tapa cloths, and food are considered necessary to insure the recovery of the sick, an idea greatly encouraged by the devil doctors.

Dengue has occurred in epidemics of varying severity two or three times each year. The last epidemic was the most severe, and extreme pain and great loss of weight were noted in a number of cases. Only one fatality was observed and that in a woman weakened by recent childbirth.

Filariasis, in its various manifestations, has been very prevalent and 56 operations for elephantiasis and many for abscesses of filarial origin have been performed. Tr. ferri chloridi, in 2 c. c. doses three times a day, continues to be the most effective treatment for acute filarial attacks and is followed to best advantage by potassium iodide;

salvarsan, urotropin, and phenocoll have been tried without success. A cure for this infection would be one of the greatest of boons to these islands. Chyluria has been observed in very few cases. Elephantiasis is located in the legs or genital organs in an undue proportion of cases; probably as a result of partial obstruction of the lymph glands from chronic leg ulcer infections and Samoan tattooing in almost solid coloring from waist to knees. The femoral and inguinal glands of such cases, when removed, are black with pigment.

Tuberculosis of lungs, glands, bones, and joints is very prevalent; especially since the measles epidemic of 1911. Most of the cases do not report for treatment until the lesions are extensive, but nearly all of them have responded well to treatment.

Framboesia or yaws is very prevalent, only a few children escaping the infection. It persists in adult life in several tertiary forms; most frequently as small lesions in the soles of the feet, subject to periodic exacerbations of tenderness with resulting limping. Several cases of chronic and extensive throat ulcerations and ulcerations of the nasal septum with resulting sinking of the bridge of the nose have been observed and are believed to have been tertiary yaws, though the treponemata could not be found. They have been cured by salvarsan and potassium iodide in increasing doses. Since June 22, 1911, salvarsan or neosalvarsan has been administered by intramuscular injection to 191 cases of yaws, with most satisfactory results in both the extensive secondary and localized teritary lesions. Syphilis, as it occurs in European races, is unknown among the people of American Samoa. The great similarity between the causative organisms and the lesions of these two diseases leads me to believe, in spite of experimental evidence to the contrary, that the two diseases were originally the same and that yaws has been modified by centuries as a disease of childhood.

Uncinariasis: About 70 to 90 per cent of adult Samoans harbor the American hookworm, though only about 10 per cent show appreciable symptoms. In the absence of sufficient Hospital Corps men it has been impossible to conduct a systematic attack against this disease and the even more prevalent ascarias. This should be done in Samoa as it was in Porto Rico with such success.

Samoan conjunctivitis, as described by Surg. Rossiter[1], United States Navy, is so prevalent that yearly epidemics occur among the Samoans, especially during the breadfruit seasons when flies are most plentiful. Few, if any, Samoan children escape the infection, and the majority of Samoans suffer from resulting Samoan conjunctivitis, often resembling trachoma, and causing much blindness from keratitis or pterygium.

[1] United States Naval Medical Bulletin, October, 1908; October, 1909.

Typhoid fever was introduced from German Samoa in early 1912, and since that time 56 cases have been treated in the Samoan hospital and the naval dispensary. It has been spread chiefly by flies and, owing to their great prevalence and the many mild cases of typhoid fever in distant villages, little can be done to prevent its spread.

Dysentery: The bacillary form of this disease occurs in yearly epidemics and its spread is also attributed chiefly to flies. I have heard of only one case of amebic dysentery and that occurred in a negro sailor who had served in the Philippines. I have seen no liver abscesses here. The cases of dysentery have usually responded readily to treatment with ipecac or salines.

Carcinoma is quite common and is usually inoperable when presented for treatment. It presents no unusual characteristics here.

Charge of the Samoan Hospital Fund.—The sources of this fund are charges for examinations, treatments, and operations at the Samoan hospital and the sale to the Samoans of drugs purchased from the fund. The charges are 10 cents for examining and prescribing; 20 cents a day for cases remaining in the Samoan hospital; \$2 to \$10 for minor operations, and \$25 for major operations. These charges have been remitted for the immediate families of enlisted men, both white and Samoan, and for children under 10 years of age. The following drugs have been placed on sale at very moderate prices:

Potassium iodide, in solution, for yaws and filariasis.

Tr. ferric chloride, diluted, for filariasis, acute.

Protargol, 5 per cent solution, for conjunctivitis.

Tr. iodine for ringworm and similar skin infections.

Sulphur ointment for scabies and similar skin infections.

Cough medicine, containing ammonium chloride and syr. picis liq.

Castor oil and a dysentery mixture are soon to be placed on sale.

On September 1, 1911, the only asset of the Samoan hospital fund was \$42.31, cash on hand. During the succeeding 20 months, \$3,487.61 was collected from the above sources. Expenditures have been made for construction, improvement of buildings and grounds, equipment and running expenses, including food supplies, electricity, laundry, medical and surgical supplies, and salaries. All expenditures are made on vouchers approved by the governor. The statement for April, 1913, shows the following assets and liabilities:

Assets:	
Cash on deposit with the island treasurer	\$307.06
Cash on hand	22.00
Medicines and supplies	165.95
Instruments and hospital furniture	421.81
	916.82
Liabilities: Outstanding vouchers	42.28
Value of fund	874.54

PREVENTION OF DISEASE.—It is the duty of the health officer of American Samoa to keep informed of the health conditions of the islands, to recommend measures for the prevention of disease, and to confer with the governor frequently concerning health matters.

The health officer and the sanitary inspector (a hospital steward) working under his orders visit the different villages and schools to investigate health conditions and instruct the village chiefs in sanitation and to follow up the health orders. The health officer makes monthly reports to the governor and to the board of health. He assumes the duties of the health officer of the port (the medical officer of the station ship) in the absence of that official and he is chairman of the board of health.

Articles written by the health officer on yaws, dengue, impetigo contagiosa, tuberculosis, typhoid fever, latrines, and treatment of boils and ulcers have been printed in the local newspaper in the Samoan language, and notices concerning typhoid fever, tuberculosis, impetigo contagiosa, uncinariasis, and ascariasis have been printed and distributed.

Owing to the fact that no other physicians or surgeons are located in Samoa, the treatment of the Samoans falls upon the medical officer of the naval station assisted by the medical officer of the station ship and forms the preponderate portion of his duties.

RECURRENT DISLOCATION OF SHOULDER.

By R. B. WILLIAMS, surgeon, United States Navy.

Habitual or recurrent dislocation of the shoulder is a not very uncommon condition. It may be due to too early use of the arm after simple dislocation; to very extensive capsular tears; to the tearing away of muscular attachments; to the breaking off of portions of the margin of the glenoid cavity, or to relaxation of the capsular ligament. This condition produces very marked disability. In severe cases any attempt at full abduction will cause dislocation of the humeral head.

Treatment may be nonoperative or operative. Nonoperative treatment is practically restricted to the application of straps or harness to limit abduction. Prolonged rest, followed by prescribed exercise with massage, may so strengthen the muscles that further dislocation will not occur.

The nature of operative treatment will depend of course upon the anatomical cause of the dislocation. As in a majority of cases this is the relaxation of the capsular ligament, our operative efforts will be directed largely to the correction of this fault, or to the taking up of the slack in the capsule. Resection of the head of the

humerus has been proposed and actually carried out with good functional results. The supraspinatus and infraspinatus muscles, found at operation torn from their insertions, have been reattached to the greater tuberosity with nails. The coracoid process has been temporarily resected in order to gain access to the detached upper margin of the glenoid cavity, and this reattached in proper position. From a superficial study of the literature it would appear that conditions such as the above are rare, and that the common cause of habitual dislocation is relaxation of the capsular ligament.

The joint may be approached from its outer surface or from its inner and anterior surface. The former method with imbrication of the capsule has recently been described and pictured by Dr. J. B. Murphy as the proper operative procedure in habitual dislocation. The method of approach more commonly employed has been by an incision from the coracoid downward along the cephalic vein. The fibers of the deltoid are separated, the upper parts of the insertion of the pectoralis major and of the tendon of the subscapularis are divided and the capsule exposed. The capsule is opened, and imbrication of the margin is effected by mattress sutures.

The advantage of the anterior incision is that it enables one to reach that portion of the capsule which is most commonly ruptured or relaxed, and to correct the defect at this point. Dr. Murphy has shown that the taking up of the slack in the outer part of the capsule is an equally effective procedure. An approach to the joint by separating the fibers of the deltoid over its outer surface is certainly a simpler method surgically and avoids cutting important structures.

The history of the case upon which the foregoing remarks are based is as follows:

C. E. S., coxswain, United States Navy, was admitted from the U. S. S. *Utah*, October 23, 1912, with the following history: Dislocation of the right shoulder first occurred three years ago from a fall on the amusement device called "the human roulette wheel." Six months later the shoulder was again dislocated from slight traumatism. Another dislocation followed in six months, after which dislocation occurred on the average of once a month up to the date of operation. On several occasions the humerus became dislocated while rowing, and at other times while doing heavy work. Once the patient awoke in his hammock to find the shoulder out of joint. Reduction was usually easily effcted, but on three occasions chloroform had to be administered.

On admission, a well developed man of 28 years. A dislocation of the right shoulder had very recently been reduced. There was tenderness over the joint anteriorly and inferiorly, with considerable limitation of motion from muscular contraction. Dislocation did not recur

subsequent to admission as the patient very carefully avoided any severe muscular effort.

Operation November 15, 1912. Incision 4½ inches in length from tip of the coracoid along the inner border of the cephalic vein, exposing the vein. The fibers of the deltoid were separated by blunt dissection and the insertion of the pectoralis major exposed. The upper two-thirds of the fibers of this muscle were divided on a director and the arm was rotated outward, exposing the flat tendon of the subscapularis tightly stretched over the head of the bone. The upper half or more of the tendon of insertion of this muscle was similarly divided, thus bringing into view the anterior and inferior portions of the capsule. The capsule was incised in a vertical direction for a distance of 1½ inches. The tips of two fingers could be easily inserted between the lower portions of the capsule and the articular surfaces. The margins of the incision were overlapped for a distance of three-quarters of an inch by four mattress sutures of chromic catgut in the same manner that the aponeurosis is overlapped in operating upon ventral hernia. The free margin of the incised capsule was whipped down to the outer surface of the capsule by a continuous chromic suture. The divided tendons of the subscapularis and pectoralis major were next carefully united with interrupted chromic gut stitches. Several chromic gut stitches were used to bring together the separated fibers of the deltoid; the skin wound was closed with interrupted sutures. Recovery was uneventful, healing occurring by primary union. Passive motion was begun on the fifth day. The patient was discharged to duty on January 3, 1913, with full use of the arm.

This case has been traced for four months and there has been no recurrence of the dislocation. In a personal communication under date of April 30, 1913, from the U. S. S. *Delaware* in reply to a request for information as to the condition of this patient Surg. R. A. Bachmann, United States Navy, writes:

> C. E. S. was examined by me upon the receipt of your letter and stated that he has had no recurrence since the operation. He has been doing the regular duties required by his rating. It may also interest you to know that I performed an operation for dislocation about a year ago. I pleated the capsular ligament with three mattress sutures and two over the insertion of the subscapularis tendon. I traced this case up for about six months and found that he had no recurrence.

Whether the operation is done in the manner here described or in the manner suggested by Murphy, it is evident that the procedure is eminently practical and conservative. Operative interference seems strongly indicated in all cases in which recurring dislocations seriously interfere with the usefulness of the arm.

THE MEDICAL DEPARTMENT IN WARFARE.[1]

By A. W. DUNBAR, surgeon, United States Navy.

War is coexistent with man and will probably occur until such a time as the interweaving of commercial and other community interests is so close, the balance between supply and demand between the various countries is so delicate, that the best interests of each power are the greatest concern of all.

With war came strategy, primitive at first, as man, his nature, his needs, and his weapons were primitive. As man became more complex war became more complicated and strategy and art necessary not only in war but, as preparedness, also in peace. The prototype of the Navy, the solitary savage in his canoe, has developed into the modern dreadnought, with its intricate machinery of offense and defense, its thousand soul of diversified specialties, all of which to assure success must be instantly obedient to the mandate of a master mind.

Sir Cyprian Bridge, R. N., in his work on "The Art and Strategy of Naval Warfare," states:

> As there can be no war without men so the human is the chief element as well as the indispensable. From age to age men remain essentially the same. They can add to their acquired knowledge, but in boldness, wariness, energy, persistence, the savage is essentially on an equality with the graduate of Oxford or the general staff officer.

This is undoubtedly true; civilization has partially concealed the savage but has not eliminated him, and in so doing has exacted a penalty—an increased sensibility to physical and mental suffering of himself and of others, and as a result demands as a necessity that which to the savage was an unborn instinct.

The savage fought with the sole idea of winning, as for him if vanquished there was no parole, no Red Cross. Of the manifold changes in man incident to the progress of civilization there is none more marked or more commendable than the growth of the humanitarian instinct which as yet has found but incomplete expression in the several international conventions for the amelioration of the condition of the wounded in warfare on land and sea.

While the Medical Department is charged with the carrying out of this mission, were it its sole mission the existence of the military sanitary service as an integral part of the militant force would be unnecessary as this duty could be relegated to the Red Cross Society or to a sanitary syndicate whose services might be employed in the event of war. In the war game the issue is practically determined by matériel directed by the commanders in chief, outside of whom the personal equation of the individuals composing the personnel

[1] Read at the summer conference, 1912, Naval War College.

is considered equal. But battles are won by men, not by a single man, however gifted. The Medical Department is concerned with the personnel; with the matériel only so far as it affects the mental or physical fitness of the individual to assist in accomplishing the mission of the Navy. "To defeat the enemy or by preparedness render war unnecessary to protect the country's interests."

The Medical Department has a part in the working of the huge machine, the Navy, charged with this mission, and unless it recognizes the mission of the whole, is cognizant of its own essential yet subsidiary mission, and is prepared and equipped to perform it, the smooth and efficient action of the whole is imperiled.

The Medical Department is, as it were, on semidetached duty, is informed as to the mission of the whole but has a mission of its own.

MISSION.—TO MAINTAIN THE SUPPLY OF FIGHTING MEN FOR THE FIRING LINE.

To accomplish this mission, having in mind the great mission, it is required not only that the firing line be supplied with men, but that they be men endowed with those qualities of mind and body which may produce fighting men through training.

So there must be selection which gives us the most important, and it is feared the least appreciated, duty of the medical officer—recruiting.

The ranks filled, it is then requisite that the combatant unit be maintained in such a state of mental and physical well being as to be able to attain the maximum degree of efficiency.

This duty is included under the broad term of sanitation, embracing the hygiene of the individual as well as the sanitation of his surroundings.

It also includes the protection of the individual from preventable injuries incident to his duties, as damage to the ears by the gun blast, the effects of deleterious gases in turrets and submarines, injury to the eyes by searchlights, by sun glare to the eyes of marksmen, and also the selection of those especially fitted for certain highly specialized duties as great gun pointers where perfect vision is essential.

If, despite the above, the firing line is weakened by disease or injury remedial measures are employed to restore the loss in the shortest practicable time, or if such a result is remote or the further continuance of the individual in the Navy or aboard ships is not to the best interest of the service, the indicated action is the elimination of the unfit—invaliding from service, or the evacuation of the sick and wounded.

As a patient in the sick bay means a vacancy on the firing line there should be no unnecessary delay in the restoration of the sick

to health and to duty, or if such a desirable consummation is not to be expected the case should be invalided from the service as soon as it may humanely be done. But it should always be borne in mind that a trained man restored to health and to duty is worth two recruits. The evacuation of the sick and wounded from combatant ships is a military service, as a patient takes the place of an able man, requires the attention of those who can ill be spared from their duties, while the presence of the dead and wounded after action tends to lower morale.

In the prevention of medical absenteeism by the detection of malingering the medical officer finds one of his most difficult and delicate duties and of which little is heard.

During the Civil War this evil depleted the ranks of the Army to a serious degree, and while less common in the Navy is, in the event of a serious reverse to our arms, liable to become more frequent.

In addition to the above, there are the strictly humanitarian duties—the care of the enemy wounded, the relief of the mortally wounded, the identification and, if practicable, the preservation of the bodies of those killed.

Finally, there is the recording of disabilities required for the protection of the Government and of the individual in the determination of the right to a pension.

From the above it is evident that the Medical Department is mostly concerned with peace strategy; but it is to be considered in war strategy; its activities are at a dead center when battle tactics begin, but with the cessation of action its greatest work commences. Before action its duties are primarily military; after it, chiefly humanitarian.

THE ENEMY FORCES.

For the purpose of analogy we may consider these as those conditions incident to war which tend to render the personnel inadequate in number or deficient in health to accomplish its mission. Also those circumstances which will make demands for the humanitarian services of the Medical Department.

The expansion of the personnel will be the first and most urgent duty.

In 1909 it was estimated [1] that the ships then in commission and the shore establishment required, on a war footing, a complement of 73,000 men, exclusive of marines.

Including the complement of ships since commissioned or to be completed, a Marine Corps of 12,000 men and the crews of auxiliary vessels, the naval establishment will require about 100,000 officers and enlisted men to place its fleet on a war footing in 1915.

[1] Report of Reconciling Committee on Question 13, 1909.

This will mean a sudden expansion from about 75,000, the probable peace complement, to obtain which will require the examination of 50,000 candidates.

The effect of war upon the health of the personnel: On the whole, unless there be shore operations in unhealthy ports, no increase in sickness is to be expected. There will be an increased invaliding rate, consequent upon rapid recruiting and the indisposition to retain doubtful cases which occupy accommodations liable to be required for the wounded. The congestion of men at depots and on board ships is liable to increase the rate for infectious disease.

If the sick rate existing during peace years is not exceeded, we may expect that of the total war complement there will be 3,300 on the sick list, of which 1,690 will be in hospitals and on hospital ships.

The casualties of war: Surg. Gen. C. F. Stokes, United States Navy, in an article on "Naval Surgery," published in the American Practice of Surgery, states that—

> Contrary to the general expectations, there has not been an increase in the loss of life on board ships during recent battles.
>
> Gunfire has become enormously more destructive, but means of defense have become to a corresponding degree elaborated, and the range at which battles are fought has been steadily increased, so that the number of casualties necessary to compel acknowledgment of defeat, the number for which we must provide, remains remarkably constant. * * * Therefore we may say that when the casualties on a ship amount to one-third or one-half of the complement she will drop out of action.

Richards,[1] as a result of an exhaustive review of the causes of deaths in naval engagements, concludes that the loss of life by drowning is equivalent to or may exceed that by gunfire.

To reduce the losses in action is a desideratum not only on humanitarian but also upon military grounds, as the personnel lost is trained and is not immediately replaceable. The loss in killed is unavoidable, but the frightful loss by drowning is to a certain degree preventable.

But it is to the living that the services of the Red Cross are primarily assigned, so that the number of the surviving wounded is what determines the necessary measures of relief to be prepared, the care of the dead being desirable but secondary.

With the increasing efficiency of the submarine and the torpedo, unless more certain means of defense are evolved, it would appear that the list of drowning will increase, while the number of the wounded surviving will decrease.

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[1] Richards, T. W., surgeon, U. S. Navy, "Loss of Life by Drowning in Naval Warfare," Nav. Med. Bulletin, April, 1912.

The casualties in action will undoubtedly be greatest on the side of the defeated, and greater in cruiser actions, exclusive of drowning, than when battleships are engaged.

A study of the losses sustained during the Russo-Japanese War has been made with the object of ascertaining the percentage of the complements involved who were killed or drowned, severely wounded, or slightly wounded, with a view to ascertaining what provision must be made for their care.

The complements used as one basis for calculating the percentages are those given by Jane in "Fighting Ships" and in Brassey's "Naval Annual." These complements would appear to be that for peace, and if so, any increase during war would make the apparent percentage greater than the actual, which is desirable, as the probable maximum is to be provided for rather than the minimum.

There are no data at hand upon which to base the casualty rate of the Russian navy as a whole.

The complement of the Japanese navy in 1904 was given as about 35,000. Their total casualties were 3,674 [1], giving a rate of 10 per cent for the entire war.

Of the above, one-half, approximately, died at once, leaving 5 per cent of the entire force who were wounded and required surgical assistance, and of whom 70 per cent (1,408) were returned to the fighting line before the war was over.

The above shows the probable demands from this source upon the medical department of the winning side during a war.

But, as stated above, the maximum requirement at one time is what we must meet, not generally, but locally. Hence, it is desirable to ascertain the number of wounded remaining after a battle.

Battle of the Yellow Sea: This was an engagement fought principally between battleships and armored cruisers, and as no capital vessels were sunk, is particularly instructive for the object in view. The Russian force of six battleships and four cruisers is estimated to have had an aggregate complement of 6,012. The reported number of wounded was 401, or 6.9 per cent.

The five battleships which returned to Port Arthur report 5.05 per cent wounded.

On the Japanese side the aggregate complement is estimated to have been at least 6,518, carried on four battleships and four armored cruisers actively engaged and four protected cruisers but slightly engaged.

The complement of the destroyer flotilla is not known and, although participating in the losses, is not included.

[1] Braisted. Report to the Surgeon General, U. S. Navy, 1905.

The total wounded was 144 or 2.2 per cent. The *Mikasa* (battleship) suffered the most severely, having 8.3 per cent wounded.

The *Nisshin* (armored cruiser) gives 3.4 per cent wounded.

In the naval engagement of August 10, 1904, off the Ulsan, there is afforded an example of what is to be expected in a cruiser engagement. On the Russian side, the defeated, the armored cruiser *Rurik* sank with her wounded, which are reported as numbering 108 out of a known complement of 1,000, or over 10 per cent.

Her sister ships the *Rossija* and *Gromboi* escaped to Vladivostock, carrying 450 wounded, which, with an aggregate complement of 2,000 men, gives 22 per cent wounded.

The Japanese wounded in this engagement is estimated as not over 2.2 per cent.[1] The *Iwate* suffered the most, having 5.2 per cent of her ship's company wounded.

In the final decisive naval battle of the war, that of the Sea of Japan (Tsushima), no definite statement as to the surviving wounded of the Russian force has been found.

The Russian battleship *Orel*, which surrendered after receiving extensive injury from gunfire, is noted as an extreme example of what may be expected in the matter of casualties.

> The second officer in command of this ship stated that no less that 140 of the hopelessly wounded were thrown overboard into the sea; that about 300 men of the 900 on board had been either killed or wounded.

This account is apparently an exaggeration of the actual losses, quite excusable in one who had so recently been through such a trying ordeal. Capt. Togo, of the Japanese navy, who was in command of the prize crew of the ship, reports that 20 men were killed and 47 wounded.

He states that 768 were transferred to other ships or to prisons, 47 wounded to the hospital, which leaves 85 out of a complement of 900 unaccounted for, which is evidently the number thrown over, dead or wounded. The wounded remaining constituted 5.2 per cent of the complement.

The Japanese Fleet sustained a loss in wounded amounting to 609, or about 6 per cent of the probable aggregate complement of 10,000 men, and of this number two-thirds were reported as being but slightly wounded. According to Lynch[2] the Japanese classify a wound as serious which disables the recipient so that he must be carried from the field. The battleships *Mikasa* had 5.8 per cent. *Shikishima*, 3.6 per cent, and the *Fuji* 3.3 per cent wounded; therefore it would seem that the greatest number of wounded must have come from the unprotected ships.

[1] Naval Annual. Brassey, 1905. Braisted reports the Japanese loss in wounded as 88, which would give a slightly higher rate.

[2] Mil. Inf. Division, U. S. Army, Vol. IV.

It appears from the above that after a general decisive engagement we may expect 10 to 15 per cent of the entire combatant force will be wounded.

Applying these figures to a main body of 32 capital ships carrying 30,000 men gives 3,000 to 4,500 wounded. A portion of this number will be slightly wounded, and may not require hospital treatment. but as a rule shell wounds suppurate and can not be advantageously treated on board ship. If we are as fortunate as the Japanese, 70 per cent, or 2,100 to 3,100, may be expected to return to the firing line, equivalent to the complement of three dreadnaughts.

OUR OWN FORCES.

The sanitary service, to meet the conditions confronting the Navy in warfare, consists of the regular medical establishment of an authorized strength of 350 officers, sufficient for peace requirements if the complement is filled, a Hospital Corps, and a Nurse Corps.

By recent acts of Congress we will soon have available two reserve forces organized to come forward to supplement the above in belligerent times. The establishment of the Medical Reserve Corps and the organization of the American National Red Cross Society, to adapt it for service with and under the control of the Navy in the time of war or threatened war, is the most important accomplishment made in recent years to prepare the sanitary service for war.

The Medical Reserve Corps, now being organized, will be selected from representative men of the profession, who, while not desirous of entering the Navy as an occupation, from patriotic motives are eager to tender their services in war.

The personnel of the Red Cross Society, consisting of physicians, surgeons, pharmacists, nurses, male and female, and lay helpers, are trained in the duties they will be called upon to perform in war, and when so engaged will be subject to military rules and regulations.

The regular Medical Corps will, as far as possible, be assigned to duty with the fleet, and in administrative capacities on hospital ships, at naval hospitals, and base hospitals wherever naval patients are received.

The Medical Reserve will as a rule be ordered to duty on hospital ships or transports and at shore stations in other than administrative duties. The Red Cross will be employed on sanitary ships, base or evacuation hospitals, and on lines of communication between them. Female nurses will have duty on hospital ships and at shore stations only.

This plan, which it is understood is that adopted by the Bureau of Medicine and Surgery, places the personnel at stations where

the particular qualifications of every individual can best be utilized. No separate establishments for the care of the naval patients will be maintained by the Red Cross, but all will come under the control of the naval surgeon, which provides for the control of and the continuity of the records of all patients, a most important consideration, in view of the unfortunate results of a lack of such a provision during the Civil War. The naval hospitals have an aggregate emergency capacity of 3,200 beds, and are equipped with every essential apparatus for the care and treatment of the sick and injured. These hospitals are so widely distributed that but a small proportion of their bed capacity would be available as sanitary bases for any one probable strategical area, being designed to meet local needs in peace.

North of Cape Hatteras are eight hospitals, maximum capacity 1,500 beds; the one best adapted as a base being that at Norfolk, Va., with a capacity for 400 beds, but with ample grounds and administrative facilities for an extemporized increase to 1,000 or 1,500 beds, and is easily accessible by water.

In the Caribbean there are no hospital accommodations, the nearest sanitary base being the Norfolk hospital, unless the campaign is based on the Panama Canal Zone, when the hospitals at Colon and Panama may be available.

In the Pacific the naval hospital at Cañacao, if the mainland is held by our forces, is sufficient for probable needs, while the station hospital ship *Relief* at Olongapo is also available.

The hospital at Yokohama would be of limited use in war, as patients sent there would in all probability have to be interned during the continuance of hostilities. At Guam there is available a hospital of 200 beds.

On the Pacific coast we have a 250-bed hospital at the navy yard, Mare Island, Cal., and one at the navy yard, Puget Sound, the latter incomplete, at present having accommodations for 55 patients, but designed for a capacity of 134 patients.

As a mobile hospital we have the U. S. S. *Solace*, capacity 200 patients, assigned to the Atlantic Fleet.

These hospitals are constantly filled to about one-half of their designed capacity by the casual sick.

For advanced base or expeditionary use a brigade field hospital and outfit is kept at Philadelphia, a regimental hospital at San Francisco, and also one in the Philippines.

The principal supply station is the medical supply depot in Brooklyn, N. Y., subsidiary stations being located at Mare Island Cal., and at Cañacao, P. I. No extensive reserve supply of medical and surgical supplies is maintained and for the increased demands of war dependence must be placed upon the market. As the Army will

also have to be supplied it may be necessary to call upon foreign sources.

By agreement with the Public Health Service, the officers and the quarantine plants of that service will be placed at the service of the Navy in the time of war.

An additional supply of officers exists to a limited extent in those retired for disabilities which do not incapacitate for recruiting duty, and also in the medical officers of the Naval Militia, who will probably be included in the Medical Reserve Corps.

The decision: To accomplish its mission the Medical Department has three lines of action obligatory upon it.

(1) To insure the physical and mental fitness of the personnel.

(2) To maintain that fitness.

(3) To relieve the combatant force of the sick and injured, and to restore them to duty in the maximum number in the minimum time.

(1) This is essentially recruiting and should be entrusted to experienced medical officers only.

Important as this duty is in peace, it becomes trebly so when the individual is to undergo the stress of war, which demands not only a normal body but also a sound mind.

(2) The maintenance of the health of the Navy comes under sanitation, which while important under normal conditions its practice is vital in war. It is not a humanitarian measure, but a military necessity. The measures employed can not be set forth here, but must be intrusted to the individual medical officer under experienced supervision.

In the promulgation of sanitary orders and their enforcement the medical officer should be allowed the greatest discretion compatible with the general mission.

In the fleet this duty should be imposed upon the fleet surgeon who should have this special assignment and be responsible to the commander in chief for its proper performance.

The fleet surgeon should be as it were the commander of a scouting force dispatched to scout out the probable course for the approach of insidious destroying disease, to convey early information of any contact with it, by the aid of his sanitary forces to form a screen or by action to foil the enemy's purpose of attacking the main body. If, perchance, the screen is pierced it is his duty to turn the searchlight of publicity on the intruder so that the united efforts of all the forces may be brought to bear on him. To accomplish this the fleet surgeon must first be worthy of and have the confidence of his chief, be given discretion which is authority, and, when required, to be furnished needed support. He must be zealous in his duties but should not allow an excess of zeal to lead him astray or across the course of the main body and thus interfere with the greater mission. Nor

should he in the pursuit of a phantom destroyer unnecessarily turn on the searchlight causing confusion and delay, and justly forfeiting confidence in his judgment.

With such an assignment of duty the commander in chief may well rest secure from this form of attack and be free to follow up his great mission.

(3) The evacuation of the sick and injured. This in the broadest sense is the removal of the disabled from the firing line, where they are an encumbrance to action, to the rear or base where they may be most comfortably and efficiently treated with a view to an early return to duty or to discharge, to give place to able-bodied men. In a more restricted and generally understood naval sense it is the removal of the wounded from combatant ships after or during action to a hospital ship or base hospital.

The naval system of the relief of the wounded may be compared to that of the military force ashore as follows:

Navy:	Army:
(1) Relief parties.	(1) Regimental aid.
(2) Relief stations.	(2) Field dressing stations.
(3) Battle stations.	(3) Field hospital.
(4) Hospital ships.	(4) Stationary hospital.
(5) Sanitary base.	(5) Base hospital.

In both services the firing line must provide its own first aid, as military reasons may render the services of the relief party impossible. It is generally recognized that aboard ship the isolation of turret and broadside gun crews will prevent the removal of the killed and wounded except after or during a lull in the action unless their presence prevents or impedes action. The individuals of these crews must therefore be thoroughly familiar with first-aid relief and be supplied with tourniquets and first-aid shell-wound packets.

The relief parties are to be stationed at the best practical and most accessible points to the guns and when practicable remove the wounded to the—

Relief stations which should correspond in number to the size of the ship, be easy of access, and have means of communication. Here the duty is principally one of selection, dressing minor injuries, returning to duty such as are able, and passing the more serious cases on to the—

Battle stations: Of these there should be two (primary), behind armor, but if sufficient protection can not be obtained a secondary station where reserve supplies may be stored should be assigned below the protective deck. At these stations the duty will be the stoppage of hemorrhage, the performance of minor surgical procedures and of such imperative operations as may be demanded, having a due consideration for the needs of the many injured.

If hospital facilities are available and conditions permit all cases of a serious nature should be transferred from the ship.

The superficial injuries which are liable to cause only a short time on the sick list should not be transferred unless there are trained reserves available to fill the vacancies, but if the contrary obtains, and especially if the ship is not liable to be engaged again soon, all wounded should be given the advantage of treatment in a hospital.

Hospital ships: The hospital ship is to the fleet what the stationary hospital is to the Army. It moves forward with the command, restores the convalescent to their commands, and transfers the more serious cases to the base hospital.

Following a fleet action we may expect 3,000 to 4,500 wounded. It is probable that some ships will have as high as 20 per cent of their personnel wounded, and among them may be some of the medical personnel; the surgical supplies may be running short, due to the necessarily frequent dressing of extensive shell wounds; the sick bay may have been rendered untenable and there is no proper place for the injured.

The evacuation of the wounded is a military necessity, and as the fleet can not always remain in close proximity to a base there must be hospital ships to receive its sick or wounded and to afford relief. To transfer all cases to the base hospital when far distant would be a serious drain upon the fighting line, and unless the line of communication is kept open would expose the wounded to the danger of capture and consequent loss to the service.

> Hospital ships steadily worked in the time of peace will habituate the service to their use in war. This will go a long way toward rendering a fleet or squadron independent of fixed bases which it may be impossible to form except at inconveniently distant points. It will perhaps appear more costly than the plan of establishing Government hospitals at fixed bases, but in the first place this is not certain and in the second place the excess of cost, if any, may be justifiably incurred because it will be due to a plan promising increased efficiency in war.[1]

Outside of the casualties of battle the fleet will require 400 beds to render it independent of a fixed base, and the wounded will probably require 3,000 to 4,500 additional, or a total of about 5,000 beds. A specially constructed hospital ship is calculated to accommodate one patient for each 10 tons displacement, and on this basis the evacuation of the sick and wounded will require 50,000 tons in the aggregate. Whether this displacement is best divided up into five ships of 10,000 tons each or into more or less tonnage is open to question. The largest ship is undoubtedly in the long run more economical; it is better suited for the purpose, due to increased stability, but it is improbable that many such ships will be constructed or pur-

[1] The Art of Naval Warfare. Sir Cyprian Bridge, R. N.

chased in the time of peace for this service, and they must therefore be obtained upon the outbreak of hostilities. It is believed that ships of about 7,000 to 7,500 tons will be more easily acquired.

If the fleet is to be independent of a fixed sanitary base these ships, either in the form of hospital ships or medical transports, must be an integral part of the fleet. If, as is most probable, the fleet will engage far from its base, the medical transports must be completely outfitted for the surgical treatment of the wounded to the same extent as is the hospital ship, and will differ only in name; either may be retained with the fleet or do duty returning the incurable cases to the base.

It is not desired to convey the impression that treatment aboard any hospital ship, no matter how equipped, is equal to a similar institution ashore in a salubrious location, but is the next best, or rather the only alternative, when the fleet is obliged to be separated from its base.

These vessels should have sufficient speed and steaming radius to keep up with the main body at all times.

The experience with the naval hospital ships in warfare, judging from the literature on the Russo-Japanese War, shows that they have been more conspicuous for the violation of the conventions under which they exist than for success in the accomplishment of their mission.

This undesirable notoriety does not appear to have been due to any initiative on the part of the hospital ship, but to military uses made of it, as for the transportation of war material, carrying official messages, and the apparent use of the *Orel* and *Kastroma* as scouts in advance of the Russian fleet.

Both the naval and the military hospital ships were extensively used by the Japanese as medical transports between the fleet and the base hospitals in the case of the former and on the line of communications in the case of the latter. A Japanese hospital ship was at Chemulpo soon after the engagement was over.

During the battle of the Sea of Japan (Tsushima) the Japanese hospital ships were at Sasebo, and after the action were summoned to relieve the fleet of its wounded, but were too late to assist in succoring the shipwrecked.

But Japan was not conducting a naval campaign far distant from a base, and having the control of the sea was enabled to transfer the sick and injured to the sanitary bases. The Russian battle fleet had two hospital ships, but both were seized by the Japanese early in the battle for alleged improper acts, and, apparently, in the absence of any record of so doing, rendered no service.

There were three hospital ships with the Russian fleet at Port Arthur, but through no fault of their own, outside of being used as stationary hospitals, their service was limited.

It is noted that the hospital ship *Mongolia* accompanied the sortie of the Russian ships on August 10, 1904, but no opportunity for her services occurred until the ships returned to port.

The function of the hospital ship is plainly set forth in the articles of the second Hague Convention. Article 4 provides that—

> These vessels must in no wise hamper the movements of the combatants.
>
> During and after an engagement they (i. e., the hospital ships) will act at their own risk and peril.

Article 16 is as follows:

> After each engagement the two belligerents shall as far as military interests permit take steps to search for the shipwrecked, sick, or wounded.

The article uses the mandatory " must," the time specified is " after each engagement," while in article 4 the use of the verb " will " conveys the impression that volition enters into the act, while the time specified is " during or after an engagement," but the act permitted is " at their own risk and peril."

Article 4 further provides that " hospital ships shall in no wise hamper the belligerents," and that they " undertake not to use them for any military purpose."

From these provisions it is understood that after an action the hospital ship must seek for the shipwrecked, sick, and wounded, during action it may do so, but at all times acts at its own risk and peril, and finally must not in any manner interfere with the military action of either combatant. The mission is great, but the opportunities for its accomplishment are strictly limited.

The risks and perils are chiefly gunfire, torpedoes, and automatic contact mines.

The danger area from gunfire is about 15 miles, from mobile torpedoes now approaching 10,000 yards. Torpedoes according to the convention must become innocuous " when they have missed their mark." Likewise anchored mines must become harmless when broken adrift and floating contact mines upon the expiration of an hour after being cast adrift.

To hamper is here understood to mean to interfere with the fire or movements of the combatants. A hospital ship may be used for military purposes in many ways, as for example, the transportation of personnel (not patients) and material intended for offensive operations, for carrying official dispatches acting as a radio relay, as a scout or even as a decoy. While it is believed that the presence aboard a hospital ship of persons who at the time are not invalids, but were brought on board as such, or of those shipwrecked, and

rescued by the ship, there having been no opportunity to disembark them, does not constitute military assistance within the above meaning, yet these persons, if belonging to either belligerent, should be removed from the hospital ship at the earliest practicable opportunity.

It is to be expected that any civilized enemy will, like ourselves, provide for his own injured or shipwrecked but, even so, circumstances may prevent his hospital ships being available, in which case we are bound to provide succor.

As a hospital ship is obliged to surrender the patients aboard to an enemy warship it is likely that in the case of a defeated belligerent the hospital ship will remain with its own side although such action is believed to be not in accord with the spirit of the Hague Convention.

As it appears that at least one-half of the death loss in modern action is due to the foundering of ships and that while the larger part of this loss is not preventable yet it does seem that in the rescue of those in imminent danger of drowning during action the ship of succor has failed through the limitations placed upon its services.

When there is a train the hospital ship is as a rule assigned to it, but after contact has been made with the enemy and an attack on the train is liable, such a position would embarrass the attacking force and would absolve it from blame for any unintentional injury inflicted upon the ship. When action between the main bodies opens the mission of the hospital ships and that of the other auxiliary vessels diverges widely, as do their probable courses, the hospital ship is required to seek the battle scene, while the train as a whole desires to escape it. Although the hospital ship is not subject to capture, the sick and wounded combatants may be demanded by a war vessel of the other side, hence it should be kept as a rule within the area controlled by its flag. This will also avoid possible complications due to the exercise by a hostile vessel of its right to control the movements of the hospital ship and thus interfere with the discharge of its duty, as in the case of the Russian ships at Tsushima. Under article 4 of the convention on this subject, in the final paragraph, it is evidently intended that the right of control is to be exercised generally through actual boarding and the entry of the orders in the log, but the addition of the words "as far as possible" indicates that other means, as by signal, or hailing may be used to control the hospital ship. It does not seem as an attempt to exercise control by wireless when the ships are out of visual signal distance would be binding upon the hospital ship.

The convention is not entirely clear as to the obligation of a hospital ship to carry out instructions as to taking a certain course given by an enemy war vessel, when in so doing it falls in with a

warship of its own flag. Would the failure of the hospital ship to completely follow the instructions subject it to seizure by the enemy?

It would appear not, for while the ministrations of a hospital ship are, under article 4, to be given " to the belligerents without distinction of nationality," yet even neutral hospital ships must be placed under the " control of one or other of the belligerents, and to that belligerent its duty primarily rests."

Prior to a general engagement the hospital ship, through its wireless, will be under the direct control of the commander in chief or of some subordinate commander. Under the present fleet organization with the flagship in the line it is improbable that there will be opportunity or means for the issuing of orders to the hospital ship, and unless its services are to await the outcome of the conflict, there must be an exercise of discretion by whomever is in command. Were the battle merely a pursuit or between equally speedy fleets the course of the action would probably approach a straight line, and the position in the rear would enable the hospital ships to succor the crews of the derelicts. But in the reality this rarely occurs, and battle tactics force maneuvering in circles or countermarching, which would cause the hospital ship to hamper friend and foe.

In view of the increasing use of floating mines in naval warfare, it is questionable if it will be justifiable to bring the hospital ships, whose services will soon be demanded for the evacuation of the wounded from the entire fleet, into an area of conflict, risking loss, for the sake of succoring a few. The Russian loss of life at Tsushima, according to Daveluy, was about 5,000 (30 per cent) out of a complement of 14,200 men. Assuming that the killed outright was 1,704 (12 per cent),[1] which is above the average as experienced in previous engagements, there were 3,296, or 23 per cent, of the entire complement who lost their lives by drowning. While it is noted that many were rescued from sinking ships by the Japanese war vessels and transports, in the case of the *Alexander*, the *Borodino*, *Navarin*, and the *Svietlana* it does not appear that the victory would have been less had a " vessel of succor " been at hand, and certainly humanity would have been the gainer.

An English writer expresses the opinion that such duty is more appropriately performed by a man-of-war, apparently on the ground " that in the event of belonging to the victor the ' vessel of succor ' would still be liable to the risk of capture and the consequent neutralization of the rescued officers and men." Lastly, such ships (hospital ships) would " need so special an equipment in the direction of life-saving apparatus and boats that their efficiency as true hospital ships would be gravely interfered with."[2]

[1] Richards, T. W., surgeon, U. S. N., loc. cit.
[2] Makins. Proceedings of the 8th International Red Cross Society 1907.

The first condition is not particularly pertinent to the question, which is to save life, and certainly there is no gain to the victor in a man at the bottom of the sea over one neutralized.

In the second case it does not appear wherein boats and life-saving apparatus are foreign to the equipment of a hospital ship, but, on the contrary, are essential to it. Furthermore, the combatant ship has its military mission, the pursuit of or an escape from the enemy; its equipment of boats is after action probably entirely destroyed; it is already burdened with wounded and can ill stand an influx of more, or even provide for the uninjured without a sacrifice of its efficiency. The use of transports or other auxiliary ships is eminently appropriate, except that they have no facilities for the care of the wounded and are not liable to be available.

It is questioned by some that a hospital ship has the right to rescue the crew of a sinking ship under the same flag while within the range of gunfire.

Also whether the crew of a foundering ship which has struck her colors may be rescued before the ship has actually sunk. While the hauling down of the flag constitutes a surrender, it does not debar those thus surrendered from effecting their escape should opportunity offer. If, having urgent duty elsewhere, the captor ship abandons the prize, the surrender is not completed, and there appears to be no reason why succor should not be afforded before the ship actually sinks.

In this connection a situation so improbable as to be highly academic may arise.

A Blue battleship which has surrendered, but has no prize crew aboard, is sinking; succor is offered by a hospital ship under the enemy flag, which is refused by the commanding officer, who sees that a Blue hospital ship will probably reach him in time, and desires to escape delivery of himself and crew into the enemy's power. Would the succor of the crew by the Blue hospital ship be construed as giving military service, and subject it to condemnation? It is believed the solution of this situation is the same as in the one immediately preceding.

It goes without saying that the Red Cross ship, like the ambulance train ashore, has no place on the firing line, and, on account of its size and value, not within the danger zone. Armistices are not unknown in battles ashore for the purposes of removing the dead and wounded, but no instance of a mutual suspension of hostilities on the sea for this purpose is known, and probably none will occur. For the personnel of the regiment there is the regimental aid of the ship, the relief party; to the rear of the regiment, the bearer battalion; to the rear of the foundering ship—nothing, until, probably too late, the hospital ship arrives.

Evidently recognizing the futility of expecting either combatant ship to afford timely and adequate succor to the shipwrecked, Sir Charles Campbell, rear admiral R. N., in an article on "The organization of a modern fleet for war" (Journal of the United Service Institution, Dec., 1906) proposes, in addition to a large hospital ship, the assignment of a hospital tender to each squadron of six battleships for this express duty.

The use of the hospital tender and its general qualities has been set forth in an article by Surg. T. W. Richards, United States Navy, appearing in the Naval Medical Bulletin, April, 1912.[1]

These tenders, by their small size, would be exposed to less danger from chance shell or mine, and their loss less serious than that entailed by the destruction of a large hospital ship, therefore they could follow more closely the wake of the combatants, willingly sharing the risks and perils of action if able to mitigate the horrors of naval warfare.

If these vessels are to enjoy what protection may be afforded by the Geneva Cross they must, under The Hague Convention, have the distinctive painting of the hospital ship, and in addition it would seem desirable to carry aloft some distinctive "shape," in order that when below the horizon there would be no liability to be mistaken for combatant vessels. Under article 19 of the Tenth Convention the commander in chief is charged with the proper carrying out of the duties enjoined by the entire convention, and to see that cases not covered thereby are dealt with in accordance with the instructions from his Government and the general principles of the convention. It may, therefore, be feasible, and is certainly desirable, to secure in advance a mutual agreement for the employment of hospital tenders, the latitude which may be allowed in their movements, and the status of the uninjured personnel rescued by them.

When and where will the general evacuation of the wounded occur? In case of victory, for the fleet as a whole, not until the pursuit is over; if defeated, not until escape is assured. Circumstances will rarely, except in cases of great military urgency, permit the transfer on the high sea.

If the battle has been indecisive, both belligerents will probably require replenishment of ammunition and coal, and if there is a reserve of personnel, the "death holes," as the Japanese call the vacancies due to those killed, will be filled. As this requires a calm sea, it will occur in a more or less sheltered anchorage as a rule, and it is here that the evacuation will probably take place.

Base hospitals: Unless we are committed to a purely defensive campaign the scene of action will be far from our home coasts and

[1] In this paper Surg. Richards erroneously attributed the article on "The organization of a modern fleet for war" to Admiral Sir Nathaniel Bowden-Smith, K. C. B.—Ed.

probably distant from even an advanced base. At the latter we will probably have only a field hospital intended for the expeditionary force.

In the Atlantic, Culebra appears to be the most logical situation of this advance base; in the Pacific, an Alaskan harbor, and Guam. The latter is the only one affording any hospital facilities at present.

If the mission is kept in view we must restore the slightly wounded to the fleet as soon as possible; these should therefore be retained on board the hospital ships at the advance base or with the fleet, but the more seriously wounded should be transferred to the base hospital, and if not returned to duty from there passed on to the evacuation hospitals in the home country for final disposition.

The base hospitals should be (1) Norfolk for the Atlantic, (2) Pearl Harbor in the Pacific. The naval hospital at the navy yard, Puget Sound, should be equipped as the sanitary base for the north Pacific.

From the foregoing it is evident that the duties of the Medical Department in warfare are with the personnel from its birth into the service until its duty is ended and the exit made by discharge, by invaliding on account of honorable scars of war or perchance by death.

It watches over it in recruithood, counsels it in maturity, ministers to its physical needs, shares its hardships, its dangers, and its mission.

In Holy Writ there is much besides theology; among other things, war strategy.

When Israel was contending with Amalek it is reported that Moses raised his hands over his hosts of warriors and their arms prevailed, but "his hands were heavy" and he lowered them; then Amalek prevailed. Seeing this, Aaron and Hur came to the assistance of Moses and "stayed up his arms, the one on the one side the other on the other side even unto the going down of the sun, and Amalek was discomforted."

Aside from any divine interposition is this not a striking example of the result of loyalty and cooperation and of the effect of the same upon the morale of the combatants.

If the Medical Department successfully accomplishes its mission and assists in supporting the arms of the service, thus contributing to its morale, it has done its part toward the mission of the Navy, the defeat of the enemy.

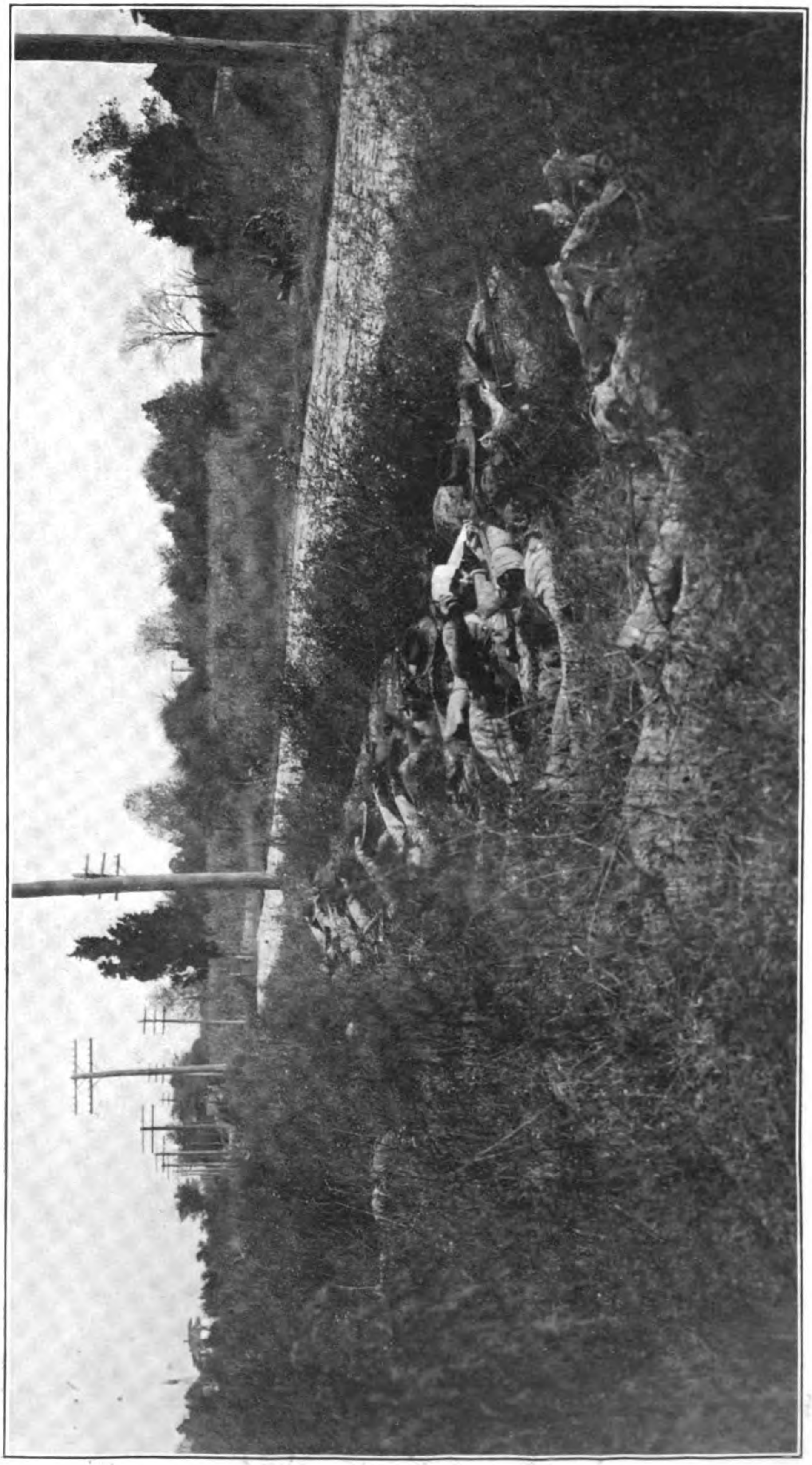
U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

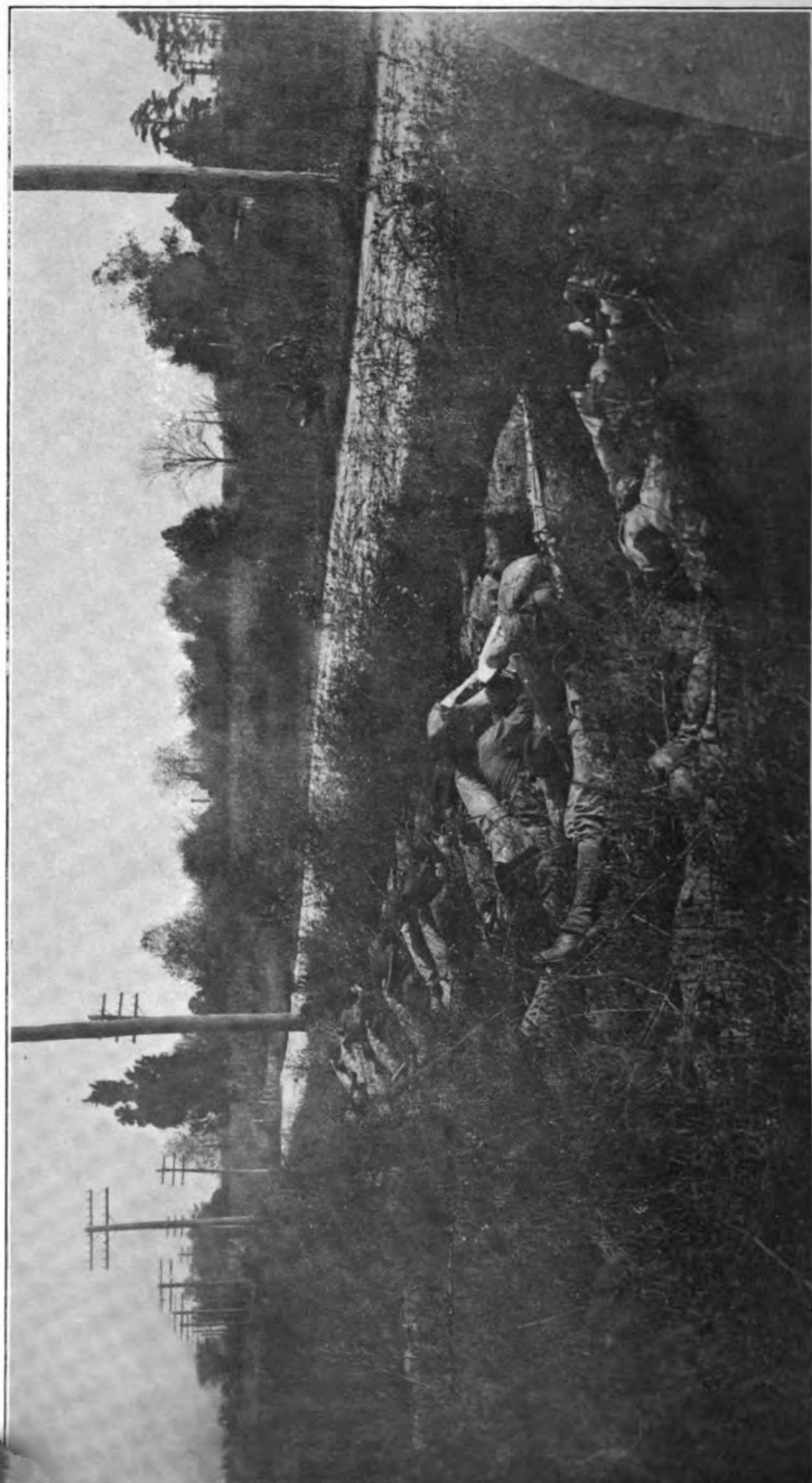
Additions to the pathological collection, United States Naval Medical School, July-October, 1913.

Accession No.	Tissue.	Diagnosis.	Collected by or received from
1020	Elephantiasis		Dr. E. U. Reed, Tutuila, Samoa.
1021	Yaws, tubercle		Do.
1028	Lung, liver, kidney, spleen, heart	Hemoglobinuric fever	Dr. R. F. Sheehan, U. S. S. Hannibal.
1033	Salivary gland	Mixed cell tumor	Dr. C. C. Wood, U. S. S. Nashville.
1035	Blood smears	Relapsing fever	Dr. R. H. Laning, U. S. S. Quiros.
1038	Femoral glands, penis, testicles	Elephantiasis	Dr. E. U. Reed, Tutuila, Samoa.
1043	Blood	Plasmodium vivax rosettes.	Dr. W. A. Angwin, naval hospital, Norfolk, Va.

Additions to the helminthological collection, United States Naval Medical School, July-October, 1913.

Accession No.	Name.	Collected by or received from
19882	Hookworms	Dr. W. A. Angwin, naval hospital, Norfolk, Va.
19883	Taenia saginata (head)	Dr. H. V. Cornell, naval hospital, Norfolk, Va.





SUGGESTED DEVICES.

IODIZED GAUZE FOR THE FIRST-AID PACKET.

By F. E. McCullough, surgeon, United States Navy.

On October 28, 1912, the following communication was addressed to the Major General, Commandant of the United States Marine Corps, by Capt. E. R. Beadle, United States Marine Corps:

It is suggested that the following recommendations be made to the Bureau of Medicine and Surgery, Navy Department, with reference to the first-aid package:

It is believed that in the future the first aid package should be made with the color to match the new uniform; also that the contents of the package should be dyed the same color with some harmless dye. It has been noted at this depot (Marine Barracks, Navy Yard, Norfolk, Va.), in connection with the field work, that one man opening and administering first aid with the present package is quite easily seen at considerable distance owing to the white contents of the package.

The accompanying photographs illustrate the ease with which the white gauze compress and bandage may be distinguished at a very considerable distance, varying with the brightness of the sunlight.

Acting upon the suggestion, the gauze used in the first-aid packet has been treated with the following:

Iodine	10 parts.
Potassium iodide	15 parts.
Water (a sufficient quantity to dissolve).	

The gauze is colored a deep brown and thoroughly impregnated with iodine. It answers the double purpose of being a confusion color, which is not to be detected from the surrounding terrain, and of supplying an iodine dressing to the surface applied, and in that iodine is conceded to be the most efficient topical antiseptic, the gauze, thus iodized, not only insures the military purpose of invisibility but furnishes an ideal method for preventing sepsis.

As the first-aid packet of the military services of the United States has a metallic container, it is essential that this metal (lacquered tin plate) should be protected from the iodine with which the gauze is impregnated. This is accomplished by inclosing the compress and bandage in medium-weight paper which has been impregnated with a boiling mixture of wax (70 per cent) and paraffin (30 per cent). The use of lacquered tin insures further protection.

Gauze permitted to remain in a rainstorm of some hours' duration, followed by exposure in the open air for 48 hours, is not materially decolorized. The presence of iodine after this exposure was demonstrated by a pronounced starch-color reaction.

In any type of container the gauze content is protected from light and decolorizing is thus prevented. While the present container for the first-aid packet (which was adopted by the Joint Board of Medical Officers of the Army and Navy, promulgated May 5, 1906) presents the disadvantage of not being easily opened, particularly in the case of an individual who has been injured, the accompanying shock perhaps rendering it impossible for him to open the packet with the device made for that purpose on account of lack of strength; also, the seam may become torn while being opened, and in consequence it may be impossible to remove the compress from the container.

The metallic container, nevertheless, is securely hermetically sealed. It is waterproof and when carried on long marches resists the perspiration of the body. It is not impossible, however, that experiment with the numerous waterproof materials on the market may develop a container easily opened and thoroughly protected from moisture. The iodized gauze, in any event, will resist contamination to a much greater extent than plain gauze, which is simply sterilized.

Iodized gauze may be used advantageously in shell dressings. In future these will probably be issued in paraffined cartons. Invisibility of material is not a necessary desideratum in such dressings, but they will probably be of greater value than the sterile or bichloride gauze in military surgery.

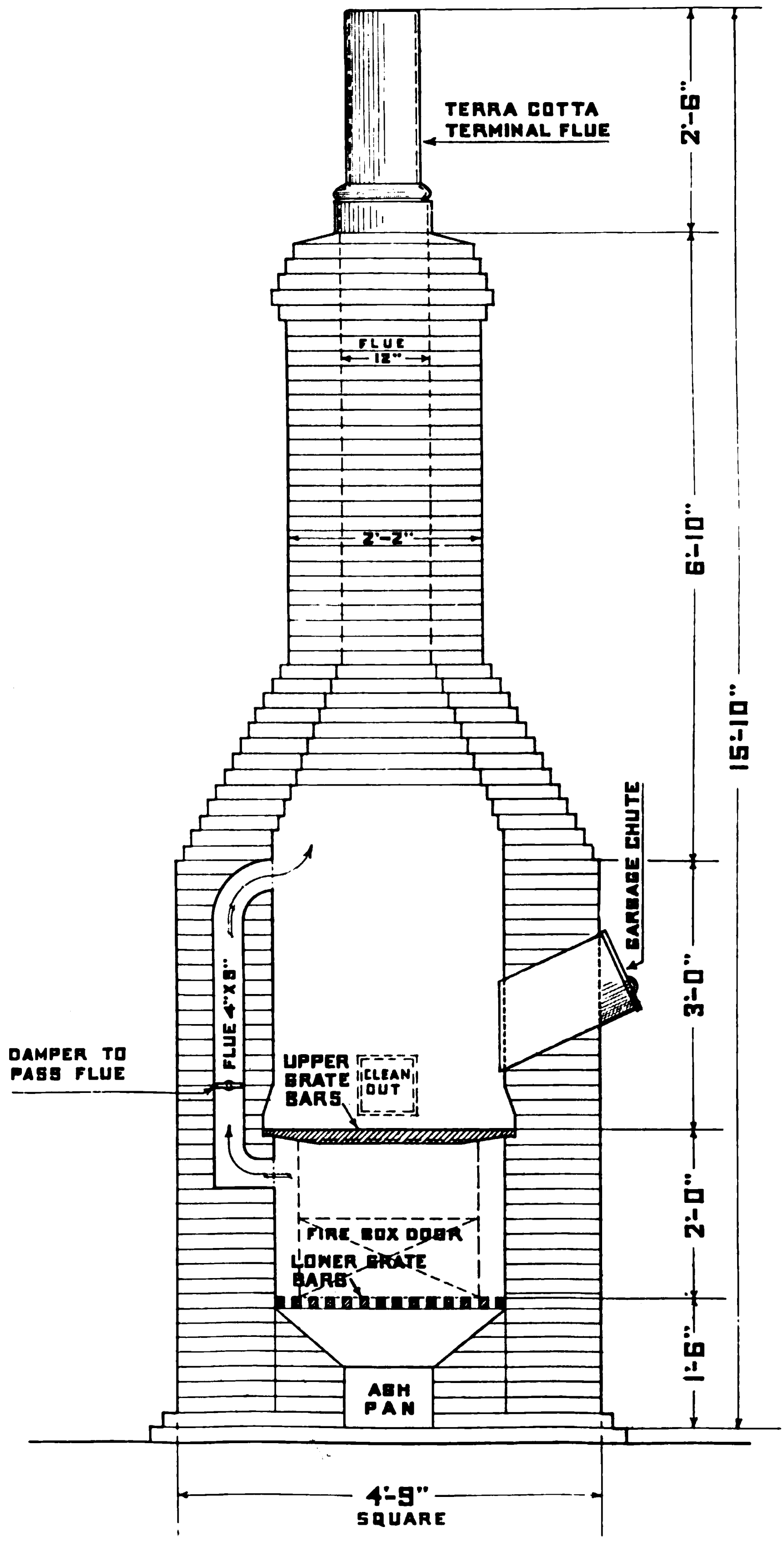
INCINERATOR.

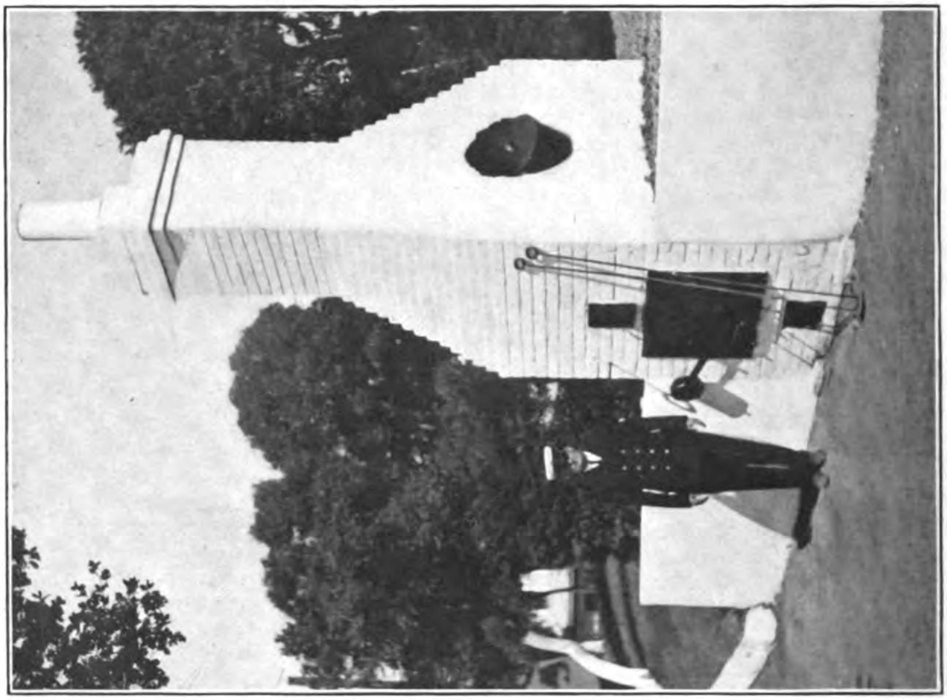
By A. Farenholt, surgeon, United States Navy.

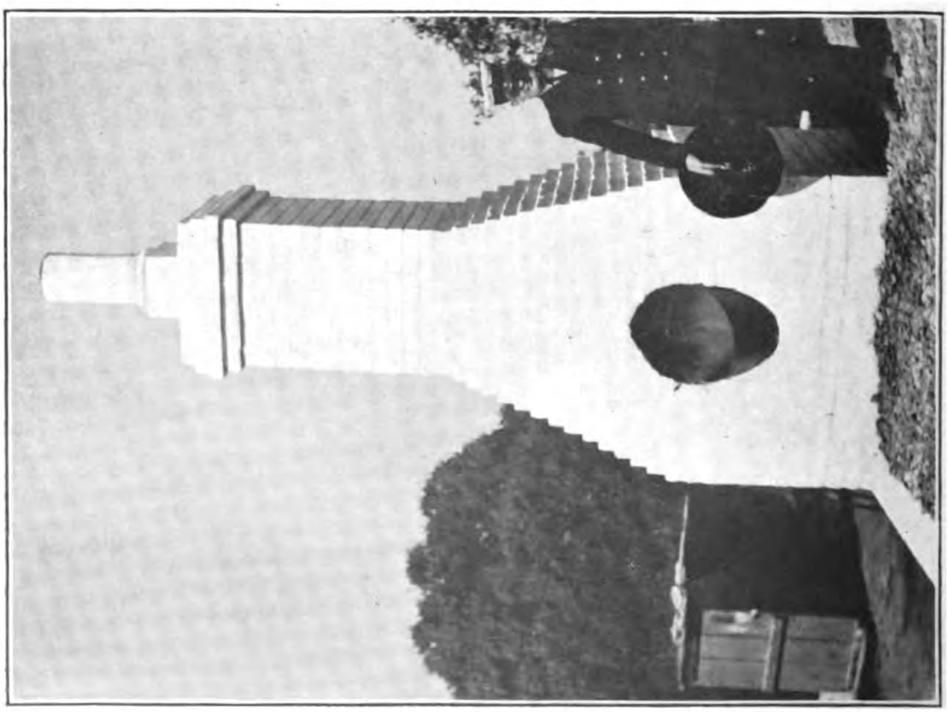
The accompanying photographs and notes describe an incinerator recently completed for use at the dispensary of this station:[1]

Total height	feet	15¾
Width outside (square)	do	5
Inside dimensions	do	2½
Height, base to lower grate bars	do	1½
Height, lower grate bars to upper	do	2
Height, upper grate bars to chimney	do	4
Length of grate bars	do	2½
Grate surface	sq. feet	6¼
Labor, 2 men for 9 days.		
Cost of cement, lime, fire clay		$16.00
Number of brick		3,700

[1] U. S. Naval Training Station, San Francisco.


TERRA COTTA
TERMINAL FLUE
FLUE
12"
2'-2"
DAMPER TO
PASS FLUE
FLUE 4"X8"
UPPER
GRATE
BARS
CLEAN
OUT
GARBAGE CHUTE
FIRE BOX DOOR
LOWER GRATE
BARS
ASH
PAN
2'-6"
6'-10"
15'-10"
3'-0"
2'-0"
1'-6"
4'-9"
SQUARE





While it is probable the cost of this incinerator, if erected by contract, would approximate $300, its actual cost to the Government was simply that of regularly employed station labor, 18 days; and cement, lime, and fire clay, $16; the brick had been previously used and discarded; the metal work had also been turned into scrap from an old bake oven; the grate bars had seen service in the station tug *Vigilant;* the receiving chute was an old smokestack elbow.

The upper set of grate bars form the floor of the drying chamber, and the thickness of the walls, supplemented by the surrounding embankment, retains and therefore utilizes the maximum of heat generated, the height of the stack insures excellent, but not too strong, draft. In this way the afternoon and evening accumulation of kitchen refuse, containing the average amount of moisture, is, without fire, sufficiently dried by 8 a. m. to cause rapid incineration with a minimum of fuel, the fire being placed on the lower set of grate bars.

There is a passover flue, the damper of which is operated by rod seen on left side of upper door; this connects fire box below with chimney above and serves to keep fire bright in case the draft through the drying chamber is cut off through smothering by an excessive amount of garbage. The bulkhead walls on either side serve to preserve the bank and help in retaining heat. There is little odor noticed, as incineration is complete. The amount of fuel necessary to operate is very little; boxes and scraps picked up around hospital and kitchen being sufficient. An incinerator of this pattern and size is sufficient for the destruction of the kitchen and hospital refuse of 2,000 men.

The following rules are in force concerning its management:

1. All garbage and kitchen waste will be burned in the hospital incinerator.

2. All floor sweepings from hospital, all used dressings, contents of dressing pails, and hospital refuse are to be burned.

3. Incinerator fire will be started at 8 a. m each day and will be permitted to burn out after 2 p. m.

4. Cooks must strain garbage over sink until all possible liquid is drained off before burning.

5. Cans, glass, and articles impossible to burn will be thoroughly cleansed and then thrown over the dump.

6. No garbage pails, boxes, or accumulation of refuse permitted; such material is to be placed in incinerator, which is always available for such purpose.

7. The fireroom force is responsible for the care, working order, and the efficiency of the incinerator.

CLINICAL NOTES.

TWO CASES OF THERMIC FEVER OCCURRING IN THE FIREROOM OF A BATTLESHIP.

By J. L. NEILSON, surgeon, United States Navy.

The two cases reported occurred amongst the midshipmen on the U. S. S. *Illinois* during the summer practice cruise of 1913.

Before going into the detail of the cases themselves a brief discussion of the conditions bearing upon them seems appropriate.

As a part of the practical instruction in steam engineering all midshipmen, for the first month or so of the trip, were taken below in small sections and taught, by observation and explanation, all that pertained to the intricacies of the actual operation of the main engines and boilers. After all had received these object lessons they were required to stand watches in the fire and engine room, actually performing the labor of machinists, oilers, water tenders, firemen, and coal passers. In other words, they took the place of the enlisted men, under the eyes of two commissioned officers and a few experienced members of the crew.

Instead of the regular routine established for the crew, which consisted of two 4-hour watches in 24, the midshipmen stood but 2-hour watches every second day. Also, in the case of those acting as firemen, each individual had but one fire to care for, as against two for the regular firemen of the crew. This arrangement was made partly on account of the large number to receive instruction and partly by reason of their being young, inexperienced, and "soft." In addition the commissioned officers and enlisted men on duty had been instructed to send any man out of the fireroom who showed the slightest signs of weakness or trouble, and the midshipmen themselves were told that they were at liberty to leave whenever they felt any ill effects from the heat. Unfortunately, this latter provision against danger amounted to little, for all showed a keen interest in the work and preferred to suffer rather than give in, a truly commendable spirit but a false pride, which in the two cases reported led to disaster.

It was not until after leaving Funchal, Madeira (Aug. 6), en route to Hampton Roads, that the midshipmen had received sufficient instruction to be able to handle the engines and care for the

boilers themselves. Also it so happened that this run of the cruise was the most trying of all on the fire and engine room forces, for the outside temperatures were high night and day (averaging for 11 days 86° F.), and were associated with a high relative humidity. At the same time a light breeze from about six points abaft the beam, combined with the speed of the ship, caused an apparent wind of low velocity from about four points forward of the beam. With the wind in this direction the ventilators to the port firerooms were blanketed by the bridge, funnels, and nests of boats, and even with the aid of wind sails, carefully rigged and trimmed, the movement of air was so slight as to be hardly perceptible when standing under the ventilators in certain of the firerooms.

In spite of these adverse conditions only three or four cases of mild heat exhaustion, unassociated with cramps, developed amongst the crew when they took up their regular duties following the development of the two serious cases which are the subject of this report. Further, these two cases were the only midshipmen who showed the effects of the heat sufficiently to require any treatment. This speaks well for the physical stamina of both midshipmen and crew, and for the ventilation of the firerooms of the *Illinois*, for upon reaching the United States it was learned that all vessels had been reporting, during this period, most unprecedented heat and humidity, even on the most northern routes, and the newspapers showed several deaths from heat affections among the fireroom forces of trans-Atlantic liners.

The history of the two cases given below is a combination of the statements made by the patients themselves after recovery, statements of officers and midshipmen on duty at the time, and personal observations. The young men were overcome the afternoon of August 9, when the outside temperature registered 85° F.

Case 1: W., midshipman, third class. Age 18. Good family history. Had grown rapidly in the past two years, was slender and not muscular, although in good general health. Had not been sick during the trip and was feeling perfectly well when he went on duty the afternoon of August 9. He had acted as coal passer for the first hour, and had nearly completed the second hour of the watch as fireman when overcome. He was working in one of the boiler rooms on the port side, which was registering a temperature of 138° F. in its coolest part, and had a barely perceptible draft down its ventilator. He was attending one fire only. During his watch he had drunk but little of the oatmeal water, the only beverage provided, and this, although cool at first (but not iced), had rapidly become tepid in the heat of the fireroom. He had stood for brief intervals two or three times under the ventilator to get the benefit of what little draft there was.

About 4.35 the regular fireman on duty overseeing the fireroom noticed that the patient was not spreading the coal well and told him to free the doorway, where the coal had banked up, but observed that he did not seem to have the strength to do it. The patient states that for several minutes before being spoken to he had felt weak and dizzy and could not see well. He was at once told to leave the fireroom and was assisted in doing so by another midshipman, but collapsed immediately upon reaching the berth deck and had to be carried to the sick bay.

When first seen by the medical officer a few minutes later (about 4.45) he was unconscious, cyanotic, and pulseless. Respirations were hardly perceptible and the pupils widely dilated.

During the process of removing the clothing he had a slight convulsion and the respirations ceased. A minute or so of artificial respiration started the breathing and the pulse returned (weak and 130 in rate), and the skin became dry, hot, and about the color of a mild degree of sunburn.

Ice compresses were immediately applied to the head, and the body was sponged and rubbed briskly with ice water. The rectal temperature at this time was 107.5° F. An additional supply of ice was soon obtained, and while the sponging of head and body continued a quart of ice water was given by rectum.

The patient remained unconscious for about 20 minutes after he was first seen, and in half an hour from that time his temperature by mouth was 99.8° F., and it was noted that the water in the rectum was very perceptibly warm to the fingers. He was dried off, put to bed, and covered with one blanket, but as his temperature continued to fall and reached 97.5° F., more blankets were added and hot, clear soup was given by the mouth. The pulse at all times was rapid (averaging about 100), difficult to feel, and easily compressible. Soon after recovering consciousness he was given 1 ounce of the saturated solution of magnesium sulphate, and for two hours after being put to bed he was very restless, but the irritability was not of sufficient degree to require bromides.

For the remainder of the night he slept fitfully, and received 6 ounces of clear soup every three hours. The temperature remained below normal and the pulse weak and rapid until about 8 a. m., August 10, but the pupils contracted to about normal before midnight. No urine was passed until 9 a. m. of August 10, and this specimen appeared a trifle concentrated and showed the barest trace of albumin, but no sediment. This was the only urine obtained that showed albumin.

He made an uninterrupted recovery, and, although feeling perfectly well the day after the accident, was kept on the sick list until the morning of August 13.

Case 2: H., midshipman, first class. Age 22. Good family history. Short and stockily built, with well-developed musculature, although not an athlete. He had not been ill at any time during the trip, and felt perfectly well when he went on duty the afternoon he was overcome. He stated that there had been a slight tendency to constipation for two days previously, but that he had had a movement each day.

At the time he was overcome he was working in one of the starboard firerooms, which showed a temperature of 128° F. and a strong draft down its ventilator. His duty was to oversee the third classmen in this fireroom, and, although not actually firing, he frequently handled the shovel for purposes of demonstration. During his watch he had taken but two glasses of the oatmeal water and had at no time stood under the ventilator.

The patient stated that before losing consciousness he had felt dizzy and an oppression in the head; had found it difficult to concentrate his mind on his work and to speak clearly. Sounds seemed dulled and distant. He believed that this condition had appeared nearly three-quarters of an hour before he was told to leave the fireroom, but that he was anxious to "stick it out" to the end of the watch, 5 o'clock. The first intimation to others in the fireroom that all was not well with him was a high-pitched, angry voice, orders that were manifestly incorrect, and a slight swaying of the body. The officer in charge immediately went to him and ordered him to leave the fireroom, but he refused and struggled against the officer and another midshipman who were leading him out. He lost consciousness when he reached the pressure chamber and had a severe convulsion, but was carried to the sick bay as rapidly as possible, and came under the observation of the medical officer a few minutes after, about 4.50.

His skin was hot and dry, but pallid, except for a slight cyanosis of the face. Respirations were slow, regular, and shallow and the pulse showed a rate of 160, with marked incompressibility. The pupils were almost pin point in size, and the lids fluttering. Rectal temperature registered 107° F.

Ice compresses to head and ice sponges, with friction, to body, were immediately started, and soon after a quart of ice water was administered rectally. About a pint of salt solution was given by hypodermoclysis. An hour later the rectal temperature was 101° F., pulse 130 and of very high tension, and respirations shallow and slow. He was dried and put to bed, lying naked in the wake of an electric fan. The coma was so deep that there was not the slightest response to supraorbital pressure, or even a hastening of respiration upon forcible dilation of the sphincter.

One hour later, as conditions had not improved, about 6 ounces of blood were withdrawn from the median basilic vein by the suction apparatus used for taking specimens of blood for Wasserman tests. Soon after the withdrawal of the blood (at 7 p. m.), the pulse began to slow down, became more compressible and the cyanosis gradually disappeared. By 8 p. m. the pulse rate was 96, the temperature 98° F., and the respirations 16. At this time he was covered with a blanket. A half hour later the pulse and respirations had further improved, but there was still not the slightest response to supraorbital pressure and sphincter dilation.

The first signs of returning consciousness (the movement of a foot), were observed at 9 p. m., but it was not until midnight that he was oriented and responded to questions. As soon as he was able to swallow he received an ounce of magnesium sulphate, but no food was given until 8 the next morning, when three hourly doses of 3 ounces each, of clear soup were started.

During the remainder of the night he was difficult to arouse, was irritable and complained of headache when disturbed, and practically all the following day remained in a deep sleep, oblivious to what was going on around him, and seemed to begrudge being disturbed for feeding and clinical observations. The first urine was collected at 9 a. m., August 10, and only showed the merest trace of albumin. As in the other case, this was the only specimen showing the presence of albumin.

For three days he had an evening rise of temperature amounting to 99.8° F., and was restless, but alcohol sponges were sufficient to reduce the temperature and allay the irritability. Otherwise he appeared, and stated that he felt, perfectly well. He was discharged to light duty August 13.

No ill effects were apparent in either case during the remainder of the trip. They were not permitted to enter the fire and engine rooms or other overheated spaces, and were advised to spend their annual leave in a cool climate, and to avoid, during that time, excessive muscular exercise, exposure to high temperatures, and the direct rays of the run.

TRAUMATIC NEURITIS OF BRACHIAL PLEXUS.

By W. A. Bloedorn, assistant surgeon United States Navy.

A. I., M. Att. first class, age 25, while attempting to board the ship's steamer fell into the water. He was picked up by the steamer's crew and pulled on board by the right arm which he had raised out of the water. On the way to the ship he complained of slight pain in the right wrist and elbow.

When examined on board shortly afterwards he showed beginning paralysis of arm and forearm, but complained of no pain except at

the elbow and wrist. A careful physical examination showed that there was no fracture or dislocation whatever and a diagnosis of traumatic neuritis involving the brachial plexus and its branches was made, caused no doubt by a stretching of the nerves when the patient was pulled aboard the steamer.

The following morning the paralysis was complete, patient being unable to move arm, forearm or fingers, all muscles including deltoid, supraspinatus, and infraspinatus being paralyzed. There was some tenderness just below and to the inner side of the coracoid process and passive motion of the arm caused pain, especially raising the arm from the side or attempting to extend it above the head. The muscles all reacted well to stimulation by faradic current.

Patient was given strychnine, gr. 1/60, three times a day and the muscles of the shoulder and arm were massaged daily. On the fourth day following the onset of paralysis the patient was able to flex his fingers slightly, the index and middle fingers being the first to improve. On the sixth day he was able to flex the forearm slightly. The faradic current was used daily and all the muscles responded well.

Following this he made slow but steady improvement, the muscles of extension and the deltoid being the last to improve. At the end of three weeks he was able to use the arm slightly. The deltoid, supraspinatus and infraspinatus muscles showed some atrophy. He could not raise his arm higher than at right angles to his body and this action was accomplished mostly by the muscles raising the scapula.

At the end of five weeks he could raise arm well above his head although the anterior portion of the deltoid still showed some atrophy. Patient was sent to duty and two months following the injury he showed no weakness of muscles.

TYPHOID FEVER WITH PERFORATION.

By N. J. BLACKWOOD, surgeon, United States Navy.

H. E. S., clerk, age $33\frac{2}{12}$, native of Boston, Mass., was admitted with the following history: No previous illness except measles when a boy. Had never received antityphoid vaccine nor had an attack of typhoid fever. On May 8 he began to have severe headache, with constipation and some fever. Condition was diagnosed as acute intestinal catarrh by a Filipino physician. On admission, at 9.45 a. m., temperature was 100.4°, pulse 94, red blood cells 7,270,000, white blood cells 8,200, polymorphonuclears 63 per cent, transitionals and mononuclears 7 per cent, eosinophiles 1 per cent, lymphocytes 29 per cent. No malarial parasite found in blood. On the following

day Widal reaction was reported positive, agglutination in dilution of 1–40 occurring in 20 minutes. On May 23 blood culture was reported positive for *Bacillus typhosus*. On May 20 and 21 there was considerable nausea and vomiting, and between May 23 and June 14 patient had four hemorrhages from the bowels, the one on the 13th of June being quite profuse.

For the first 11 days after admission patient's temperature ranged from 100° to 104°, but on the twelfth day, which was practically the beginning of the fourth week of the disease, the temperature began to fall, and on May 30, the twenty-third day of disease, reached the normal and remained there for practically 24 hours. From June 1 to June 7, or the twenty-fifth to thirty-first days of disease, temperature touched normal for at least a part of each day, but also rose at times to 102°, and after this date it never again fell to the normal until the forty-third day, which was the day following the operation, but was always between 100° and 104° and markedly irregular. During all these days the pulse was practically in accord with the temperature and was fair to good in quality. The bowels were constipated throughout the course of the disease, and it was necessary to give enemas every alternate day in order to make them move at all. Nervous and pulmonary symptoms were practically absent.

At about midnight June 17, the forty-first day of the disease, patient felt a severe pain in the abdomen, referred particularly to the right iliac region, which lasted about 10 minutes and left all that region sensitive to the touch. His temperature went up from 99.2° at 8 p. m. to 102.5° at midnight and his pulse from 82 to 116. The pain at about 2 a. m. of the 18th was so severe and of such a continuous griping character that he was given a hypodermic injection of morphine sulphate, gr. 1/8, under the influence of which he fell asleep. At about 4 a. m. I was called, and having made the diagnosis of perforation, he was prepared and sent to the operating room. Ether anesthesia was begun at about 5.20 a. m., with temperature 103°, pulse 120. Patient took the anesthetic very well, but respirations were poor during the first part of the operation, and pulse was very poor, but both improved after hypodermic injection of strychnine sulphate, gr. 1/30, and hypodermoclysis of 1 quart of normal salt solution given in the chest. One hundred and twenty-five grams of ether were required for anesthesia. The abdominal cavity was opened through a median incision below the umbilicus, cutting directly through everything, and almost at once the perforation was found. This consisted of a small round punched-out looking hole about one-eighth inch in diameter in the ileum opposite its mesenteric attachment and about 8 inches from the ileo-cecal valve, and lying at the lower end of what could be felt as a long patch of ulceration on the mucous membrane of the gut. No fecal matter or pus was

found in the abdominal cavity, but gases were bubbling out through the perforation and there was some inflammatory lymph surrounding it. This being carefully wiped off, the opening was closed with a silk purse string suture and then infolded transversely with four Lembert sutures.

The whole operation up to this point had occupied but 10 to 12 minutes, but the abdominal cavity could not be closed without an examination of the appendix and a careful search of both the ileum and cecum for more perforations. The former was found to be normal, but bound down by old adhesions, and the latter revealed no more perforations. The wound was closed in layers with continuous catgut sutures and the skin with silkworm gut, leaving a drainage tube in the center. Patient was returned to bed, placed in Fowler's position, and proctoclysis begun at once, being given at the rate of 4 quarts in 24 hours, for three days, with intervals of time between each half pint, as long as the bowel would retain it, and nothing by mouth except small sips of water. Within four hours after the operation temperature fell to 99.5°, and the next day to normal, where it remained steady for two days; but the pulse was high and not very strong, reaching at one time 160, and never going below 104, even when the temperature was normal. Feeding was begun on the fourth day after operation, the drainage tube was removed in 48 hours and a small gauze drain substituted for two days more, the stitches removed on the seventh day, and the patient passed into an uneventful convalescence, being up and out in a wheeled chair on the twenty-second day after operation. The Schaffer and Coleman diet was used during the entire course of the disease up to the time of operation.

This case presents many points of interest for consideration, viz. (1) The demonstration of the fact that typhoid fever of severe type does occur in the white race in the Philippines, and is much more common than was formerly supposed, this being one of three cases in the hospital at the time; (2) the lateness in the disease of the perforation; (3) the immediate subsidence of the fever after operation; and (4) the almost typical symptoms at time of perforation, and the excellent result of operation within a few hours afterwards.

ANAPHYLAXIS WITH DEATH.

By W. H. Connor, Passed Assistant Surgeon, United States Navy.

———, 19 years of age, was given 20 c. c. of a well-known therapeutic horse serum, 10 c. c. internal to each scapula, observing the usual aseptic precautions. About three minutes after the second injection the patient sat up in bed and said, "I wonder what is the matter with me; I am tingling all over." Immediately he became

very restless, tossed about the bed, and had the general appearance of a very much frightened individual. The pupils were moderately dilated, an erythematous eruption was spreading over neck, arms, thorax, and abdomen (lower limbs were not observed), and small drops of perspiration appeared upon face and neck. At the onset the face was flushed, soon becoming pale, and then cyanotic. The pulse, which before and just following the injections of serum was regular, of good volume and tension, soon became rapid, somewhat irregular, and of poor volume and tension; respirations were increased and shallow, but in a brief time became slower and labored, the dyspnœa being of the expiratory type. There was general muscular twitching, clonic in character, but no convulsions. A cyanotic condition of the entire body soon supervened, and death ensued in about 15 minutes from the time of the first injection. Hypodermics of atropine and strychnine had no apparent effect. Artificial respiration was instituted at once, and as soon as possible the Draeger pulmotor was substituted and continued for over an hour.

Examination into the patient's past history was negative, as he had stated that he had had no previous sickness of any description. However, too much confidence can not be placed in the medical history of recruits, as their opinion of the service is apt to influence their statements to a great extent. If the service appeals to them a good medical history usually results, while, on the contrary, a bad previous history is considered equivalent to a coveted discharge. Physical examination had demonstrated no pulmonary, cardiac, or abdominal lesion. There was no glandular enlargement.

Post-mortem examination performed by Dr. K. C. Melhorn, United States Navy, threw no light upon the condition, for, beyond the lungs being somewhat distended and a congestion of liver, spleen, kidneys, and brain, examination was negative. No enlargement of thymus, thyroid, or other glands was demonstrated, so status lymphaticus can be disregarded. Microscopic examination of the heart at the United States Naval Medical School showed some thickening of the coronary arteries. Wassermann reaction was negative.

There are a few possibilities that should be considered:

(1) Was it a case of maternal transmission of hypersusceptibility?

(2) Was he ever, as a child, an inmate of a hospital where, upon entrance, serum is given as a routine prophylactic?

(3) Was the patient a victim of horse asthma?

As regards the first, Rosenau and Anderson have demonstrated the transmission in guinea pigs of maternal hypersusceptibility; the second is self-explanatory; while the third, considering the history, is the most probable. I know an individual who gives a typical history of horse asthma and who realizes that the horse is the exciting cause of his most serious attacks. He had many attacks, covering

a period of two years, before he realized that the horse was the exciting agent. As much of his time is spent at sea, it might require careful questioning to bring out this hypersusceptibility, as he might disregard the condition after many months removed from an attack.

At present there seems to be no reliable method by which we may determine the hypersusceptibility of an individual or obviate anaphylactic shock. We must depend largely upon a careful verbal and physical examination; the first directed toward a previous use of sera or presence of horse sickness, the latter particularly to asthma. In the presence of the above contraindications we must weigh carefully the mortality from the disease against that from anaphylaxis. While the death rate in the use of sera is probably in the region of 1-100,000—about the same as from the use of salvarsan—it is known that the rate with the above contraindications is unusually high. Another patient, the same day, had been given an injection of same stock serum, using the same precautions and selecting the same area for injection.

TWO CASES SIMULATING APPENDICITIS.

By F. M. FURLONG, surgeon, United States Navy.

Case I. A petty officer, 25 years of age, was admitted to the United States naval hospital, Chelsea, Mass., with a diagnosis of appendicitis. About four days before he had been seized with pain over the appendix, with febrile symptoms and a leucocytosis of 12,000. There was also a history of having been ill about six months before with symptoms of pulmonary tuberculosis, which subsequently cleared up.

On admission the patient was found to be a well developed and nourished man. Temperature 105°, pulse 102, leucocytosis 15,000. Palpation disclosed a tender and painful area over McBurney's point, with slight rigidity. Preparations were made for operation. The abdomen was entered through the right rectus incision. On opening the peritoneum a large amount of clear serous fluid escaped. The appendix presented itself in the wound and was removed, but there did not appear to be any pathological involvement of it. Further search showed a bunched and thickened omentum in the right iliac region, and over all the peritoneal surfaces, small intestine, large intestine, and mesentery were myriads of small white nodules, ranging from a pin point to a pinhead in size. After sponging out the serous fluid the wound was closed. The patient's condition gradually failed, and he died 12 days after admission.

Autopsy disclosed a condition of tubercular peritonitis. Both lungs were bound down by firm pleuritic adhesions, the apex of the right lung was somewhat consolidated and contained a large cavity

with a large caseous mass the size of a small peanut. In the ilium were several tubercular ulcers.

Case II. A petty officer, aged 29 years, was admitted at 5 a. m. with a history of having been seized at 9 p. m. the evening before while on liberty with pain over the appendix. He was seen by a civilian physician, who made a diagnosis of appendicitis. On admission the patient gave a history of having never been sick before. Temperature was normal, pulse 90, white count 15,000. There was great pain over McBurney's point, together with exquisite tenderness, and the whole abdomen was rigid. A diagnosis of appendicitis was made.

Operation was performed as soon as preparations could be made, through the right rectus incision. The appendix was easily found and, with the exception of a small twist about its middle, appeared normal. There was no inflammation of the peritoneum in the vicinity, though a small amount of clear yellowish colored serum escaped when the peritoneum was opened. The abdominal wound was closed and the patient was put to bed, but instead of improving his condition became worse. At 1 p. m. temperature was 101, pulse 100, respiration 40, and there was still great pain over the right iliac region, though the rigidity had disappeared. At 8 p. m. temperature was 102, pulse 120, respiration 60. As the patient's condition was rapidly getting worse, further exploratory operation was decided upon. An incision was made over the epigastrium, through the right rectus muscle. On opening the peritoneum a large amount of yellowish colored flocculent fluid escaped, followed by what appeared to be pure bile. The fluid was mopped out, and a small round perforation one-eighth inch in diameter was found in the first portion of the duodenum, through which frothy bile stained fluid was escaping. There was an area about three-fourths inch in diameter surrounding this perforation. The ulcer was infolded by a continuous Lembert suture of chronic gut, a large drain was inserted, and the wound closed. At the conclusion of the operation the patient was in a profound condition of shock, pulse 160, respirations 70; but the next morning his temperature was 99, pulse 98, respirations 32. The drainage was subsequently removed and the wound completely healed.

He improved rapidly, and is now ready for duty.

In reporting these cases no claim is made that anything new has been discovered, but only to illustrate that a certain number of cases presenting the usual symptoms of appendicitis may prove to be other affections.

EDITORIAL COMMENT.

MEDICAL CORPS REPRESENTATION AT THE NAVAL WAR COLLEGE.

The custom of detailing a medical officer to attend the summer course at the War College has been of marked advantage not only to the officer himself, giving him a broader grasp of the relationship of his own special field to the operations of the Navy as a whole, but his participation in the discussions of subjects coming within the particular sphere of the medical department appears to be appreciated by his confreres. The opportunity thus afforded for a free exchange of opinions, from different points of view, and a better understanding of the aims and efforts of the different branches of the service toward a common goal, goes far toward the training and cooperation which are so essential to service efficiency.

Medical officers who have attended these courses are unanimous in their appreciation of the cordial assistance received, not only from members of the staff, but from student officers of the line.

Specialization is indispensable in a highly complex organization such as the naval service of to-day, and in the case of medical officers specialization is of necessity carried to an extreme degree. Therein certain dangers arise, for the more active and able an officer may be the more apt he becomes to center his ideas along restricted lines, losing sight of the ultimate aim of promoting naval efficiency in his enthusiasm for the attainment of more immediate, yet subordinate, results.

I have repeatedly endeavored to emphasize these views in lectures at the War College and elsewhere and to impress upon medical officers the necessity of looking upon their duties as primarily military and not, as in civil life, essentially humanitarian. Anything which brings the medical officer in closer touch with his brother officers in other branches of the service makes for the common good.—(C. F. STOKES, SURGEON GENERAL, UNITED STATES NAVY.)

TRAINING SCHOOL FOR NATIVE NURSES IN SAMOA.

A school is to be established in American Samoa for the purpose of training native Samoan women in the principles of nursing, with a view to their making use of this teaching in their own country and among their own people.

To establish this school, two members of the Nurse Corps, United States Navy, have been ordered to Samoa, and they, together with the medical officers attached to the station, will give the necessary instruction.

The course of training will be very practical and as thorough as possible. Due consideration will be given to the education and environment of the pupils in order that the scope of the instruction may not be beyond the comprehension of the native women.

In Guam a similar school has been in operation for a long enough time to indicate that the policy is thoroughly feasible and of infinite value in alleviating suffering and diffusing a knowledge of sanitary principles among the native population.

ANNUAL REPORT OF THE HEALTH OF THE IMPERIAL JAPANESE NAVY FOR THE YEAR 1910.

The number of patients suffering from disease or injury during this year shows an increase as compared with that of the preceding year, but the number of days' sickness exhibits a remarkable decrease in comparison with the last year.

Under the heading of paratyphoid fever there were 205 cases, the infection is believed to be largely by carriers, and the increase in the number of cases of late years is attributed to the accuracy of bacteriological diagnosis.

There were 24 cases of beriberi, 0.54 per 1,000 of force, 14 suffered from the disease before entering the Navy, and of the others only 4 had received the full Navy ration.

In spite of the difficulty of contrasting the reports of navies which use different methods of classification, it is believed that the table given below compares accurately the statistics of the Navies of Japan and the United States for the calendar year 1910. With the exception of the first item the figures indicate the rate per 1,000 of the total force.

	United States.	Japan.
Mean daily force	58,340	44,323
Admissions and readmissions, all diseases	711.84	739.62
Deaths:		
All causes	5.66	5.39
From disease	2.73	2.96
From suicide	.17	.47
From injury	2.93	.77
Invalided: From service	28.95	16.45
For disease	20.40	15.05
For injury	3.91	1.40
Typhoid fever:		
Admissions	3.76	4.78
Deaths	.15	.63
Tuberculosis:		
Admissions	5.94	6.59
Deaths	.32	.43
Venereal diseases	195.41	128.83
Diseases of:		
Eye	13.52	30.32
Ear	9.77	11.84
Skin	40.09	93.20

PROGRESS IN MEDICAL SCIENCES.

GENERAL MEDICINE.

A. W. DUNBAR, surgeon, and G. B. CROW, passed assistant surgeon, United States Navy.

MENNELLA, ARCANGELO, DOTT., MAGGIORE MEDICO. **On the origin of dreams.** Giornale di Medicina Militare. Anno LX, Nov.–Dec., 1912, Fasc. XI–XII, p. 843.

Dreams, in the opinion of the author, are pathological as regards their origin and always due to intoxications of varying nature and degree. After reviewing the nature and causes of sleep, he passes on to the discussion of the causes of dreams, which he finds always within us, with toxines as the chief contributors. These toxines may be endogenous or exogenous. Dreams, for our author, are, therefore, unconscious reactions of the sensory centers of the cerebral cortex, provoked by toxines. More frequent than any other are those of gastro-intestinal origin; these, in the opinion of the author, are the most permanent causes of irritation of the sensory and motor areas of the cerebral cortex and dreams vary in intensity, not only in direct proportion to the excitability of the nerve centers themselves, but also in proportion to the quality and quantity of the toxines circulating through the brain in the blood. The length of this most interesting article does not permit us to do more than give a few of the conclusions:

I. In the well the principal origin of these toxines is in the intestinal canal and with which may become associated those formed in fatigued muscles, brain, and the rest of the body.

II. When the quantity of the toxines is large, both sensory and motor areas become involved, giving rise to irregular, limited, unconscious movements.

III. In sick persons the toxines produced by the disease are added to the above.

IV. The diseases giving rise to the most anxious and strangest dreams are the fevers, intracranial affections, and gastro-intestinal canal.

V. The intensity of dreams is not determined by the particular disease, but by the quantity and quality of the toxines.

VI. With the same amount of circulating toxines two cases may differ in direct proportion to the excitability of their nerve centers.

VII. The reactions of the nerve cells to circulating toxines during sleep are very intense in neuro and psychopaths, very slight in the phlegmatic.

VIII. The circulation through the brain influences the vivacity of dreams, this being more lively in children than in old people affected with arteriosclerosis.

IX. Many of the exogenous poisons give rise to vivacious dreams (alcohol, etc.), others to characteristic ones (opium, phosphorus, hashish, santonin).

X. The intense emotions experienced during waking hours are reproduced during dreams by the same causes by which dreams are remembered after waking—overexcitability of nerve centers, increased blood circulation, and increase in autotoxines.

XI. The phenomena of unconscious cerebration during dreams are an effect of a greater impressionability of the psychic centers, owing to their intoxication by cerebral fatigue poisons during the day.

XII. External stimuli may give direction to the contents of a dream, but the cause of it is always internal and of toxic origin.

XIII. The ideas of dreams, as the hallucinations, are of central origin, while those of consciousness are of external origin; the former are centrifugal, the latter centripetal.

XIV. The supine position gives rise to anxious and strange dreams only when going to bed on a full stomach—a time when toxic ferments are produced in the stomach.

XV. Digestion during sleep in the erect posture is slowed, but not arrested; it can not be completed in the horizontal position.

XVI. Dreams normally come on a few hours after the beginning of sleep. When, however, toxins are abundantly present in the circulating blood, as in cases of fever, they appear soon after meals, in dietetic indiscretions, alcoholic intoxications they come on suddenly.

XVII. Changes in the weather render dreams more lively in man and animals through their influence on the intracranial circulation and by their resuscitating old morbid processes, and especially uremic conditions.

XVIII. Dreams often reflect the daily life, but they sometimes also reveal the remote past and become strange.

XIX. In dreams consciousness is absent; but in emotional dreams consciousness may return at any moment, or whenever from any cause the heart's action is increased and more blood is sent to the brain.

XX. A return to consciousness is either complete or incomplete in accordance with the amount of blood circulating in the brain.

XXI. The total or partial appearance of consciousness during dreams impresses the contents of a dream upon the brain, so that they are more or less remembered on waking.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

MOORE, J. D., M. D. **The occurrence of the syphilitic organism in the brain in paresis.** The Journal of Nervous and Mental Diseases, March, 1913.

This writer, using sections of the brain taken from 70 paretics and staining with the Levaditi silver method, the sections having been taken from that part of the brain in which the process was most intense (this in most instances being the frontal region and the gyri recti), found the treponema to be present in 12 of the above number.

The organisms in these cases were found to be most numerous in the nerve cell layers of the cortex, and not in the pia or vessel sheaths, it being the exception to find the treponema in the vicinity of the larger blood vessels. In none of the cases were gummata present. The other conditions usually found in paretic brains were evident in all specimens: plasma cells outnumbered the lymphocytes; rod cells were always present.

Clinically all cases were unquestionably paresis, showing the classical physical signs and mental symptoms.—(G. A. RIKER, PASSED ASSISTANT SURGEON, U. S. NAVY.)

CARLSON, A. J., AND WOELFEL, A. **The solubility of white lead in human gastric juice and its bearing on the hygiene of the lead industries.** American Journal of Public Health, August, 1913.

The relative importance of the skin, the lungs and the digestive tract as avenues of lead absorption in workers in the lead industries seems to be determined only to the extent that the skin is the least important. Goadby subjected cats to breathing air charged with various kinds of lead dusts and lead poisoning resulted in every case. When the same lead dusts are given by mouth a much greater quantity is required than in the case of inhalation, the ratio being estimated at 100 to 1.

Practical experience seems to show that milk or other food in the stomach minimizes the danger of lead poisoning from the digestive tract. When milk and gastric juice are mixed in equal parts, lead salts added, and the mixture incubated at body temperature for 10 hours not enough lead goes into solution to give a qualitative lead test. But when the ratio of the gastric juice or hydrochloric acid to the milk is increased the lead salts are dissolved in proportion to the increase in quantity of gastric juice or hydrochloric acid. The action of milk is probably due to the fixation of the hydrochloric acid by

the milk protein and the neutralization of the hydrochloric acid by the carbonate of the milk. Hence when an excess of milk is added to the gastric juice there will be no hydrochloric acid to effect solution of the lead salts, while in the presence of an excess of gastric juice some free hydrochloric acid remains to act on the lead. The authors are inclined to the view that the formation of insoluble lead albuminates is a factor of minor importance in the action of milk.

Two practical suggestions are offered: (1) The lead carbonate is so much more toxic than the lead sulphate that the elimination of the use of the carbonate in industries should be aimed at. (2) In addition to the other prophylactic measures, the lead worker should drink a glass of milk between meals in order to diminish the chances for any lead to be dissolved by the free hydrochloric acid of the gastric juice, as in some persons there is considerable secretion of gastric juice in the empty stomach.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

O'MALLEY, MARY, M. D. **A psychosis following carbon-monoxide poisoning with complete recovery.** American Journal of Medical Sciences. June, 1913.

Carbon-monoxide poison is very common, but while a psychic disorder consequent upon it has long been recognized but few cases have been reported. The number of fatalities from this gas is on the increase in industrial occupations. The increasing use of gasoline as a motive power is partially responsible for this, and the opinion of Surg. Gen. Stokes, United States Navy, is quoted as to cases occurring in turrets and firerooms of naval vessels.

The symptoms are as follows: Increased blood pressure at first, with slowing of the pulse and pounding heart beat; later, lowering of the pressure, with rapid but small pulse, and, not infrequently, with discrete spots of dilatation in the superficial blood vessels. Remarkably pale-red discoloration of the blood and of the dilated spots: formation of carbon-monoxide hemoglobin is demonstrated by the spectrum. (*a*) Disturbances of the general health: In mild cases dull headache, flashes before the eyes, giddiness, ringing in the ears, nausea and fullness in the gastric region. (*b*) In severe cases bluish discoloration of the skin; spasmodic, wheezing respiration; sometimes tonic and clonic convulsions, more often paralytic symptoms, either with weakness of all the extremities, or of the lower only; or, indeed, of only single groups of muscles, including also the facial muscles. The convulsive stage, which may be altogether absent, is succeeded by the stage of asphyxia, with sensory and motor disturbances, involuntary voiding of urine, semen, and feces; subnormal temperature, weak, slow, and intermittent pulse; loss of consciousness. As sequels there have been observed pneumonias, inflammations of the skin, paralyses,

and psychoses, the last two often pursuing an unfavorable course. Chronic poisoning, among ironers, firemen, and cooks; frequent headaches, dizziness, nausea, vomiting, coated tongue, weakness of memory, anemia without chlorosis, "hot flushes," formication, palpitation of the heart, insomnia, general debility, and feebleness of the psychic functions.

Loss of memory is the most marked psychic symptom of the psychosis. Its onset is generally sudden, differing from traumatic and alcoholic amnesia.

It may be the sole symptom, and it may be transient, lasting but a few hours, or days, or again persisting for years. It may appear after a considerable time has elapsed since the acute poisoning occurred. The amnesia may effect events prior to the accident or again only subsequent to it. Many writers note a marked aphasia, apparently a true amnesic type. A marked reduction in the emotional field is noted by some; there is a fixed masklike expression of the face. Again there may be causeless and uncontrollable laughter.

In the case reported by Dr. O'Malley the patient recovered from the psychosis, but an extended observation of a series of these cases is lacking. In a mine catastrophe at Courrieres with 1,100 victims observations extending over two and one-half years were obtained, and it is reported that none made a complete recovery.—(A. W. D.)

HOCHWART, L. V. F. **The relations of internal secretions to mental conditions.** Amer. Jour. Med. Sci. Aug. 1, 1913.

This subject is one of increasing interest and one upon which much attention has been centered during the past 10 years, both in the way of experimentation and clinical observation. The writer states that in giving an outline of what he as well as other investigators have done in this line he feels that while the facts are incomplete and that hypotheses play an unduly prominent part, such an outline is desirable if only to indicate the lines of future thought.

The influence of the testicular and the ovarian secretions on the mentality of the adolescent is a familiar example of the psychic effect of internal secretion upon the mind. Confined within proper limits these internal secretions are productive of a normal sexual differentiation, but in either sex, if carried to an excess or especially in those of a neuropathic tendency, may cause an excessive sentimentality and youthful psychosis. In both males and females at an age when there is a cessation of the internal genital secretions there may be a nervous emotional state in which the subject is liable to attacks of perspiration, palpitation of the heart, insomnia, lassitude, and headache. The memory grows dull, the individual apathetic and hypochondriacal (melancholia involutional).

But on the other hand there may be consequent upon the decline of sexuality a state of psychic rest during which there is not the tendency to produce new and enthusiastic ideas but rather to view and review life fairly.

Experimental castration in the young causes a change in bodily development, in psychic conduct, so that liveliness and aggressiveness are missing. Later in life this operation causes less evident physical change, but conditions of depression and psychoses are frequent.

In the case of the thyroid gland, we have the most striking clinical evidence of the effect of hypo- and hyper-function on the mental character.

In hyposecretion, the condition known as myxedema ensues; there is a complete lack of emotion, the patient is dull-witted and indifferent, memory and judgment are impaired, and psychoses are not rare.

In hypersecretion, on the contrary, the patient is extremely emotional, there is a state of nervous instability as evidenced by the trembling, the tachycardia, the alternating congestion and pallor, the outbreaks of perspiration, and of diarrhea.

Tetany has been shown to be due to an affection of the parathyroid glands, and it frequently terminates in an abnormal mental condition, if not in an actual psychosis. The person becomes timid, uneasy, excitable, and quarrelsome. Depression may at times occur.

Our knowledge of the thymus gland is limited, except that its extirpation in animals has produced a condition of feeble intelligence.

During the last decade much light has been thrown on the function of the "brain glands," the pituitary gland (the hypophysis), and the pineal gland (the epiphysis), and their influence on mental conditions.

The hypophyseal affections have been divided into two groups, the acromegalia and the dystrophia adiposogenitales (Frölich's type) in which various psychoses have been described.

Schuster found that 65 per cent of hypophyseal tumors are accompanied by pyschic disturbances. While the number of actual hypophyseal psychoses is somewhat overestimated, the fact that mental disorders are so frequently associated with disease of the pituitary body gives food for thought.

The pineal gland is supposed to influence genital development, its absence causing precocity in sexual and mental growth.

Of the abdominal organs, the pancreas, through its internal secretion, plays a large part in relation to diabetes, and diabetics often show mood anomalies and actual psychoses.

The suprarenal glands, when diseased, apparently cause a tendency to melancholia.

In conclusion, it will be seen that we know of a number of the effects of the internal secretions on mental conditions and how the development of the mind is dependent upon them, and the time may come when we may perceive how much depends on the individual structure of certain glands and on their individual internal secretion.—(A. W. D.)

PALFREY, F. W. **The administration of ox bile in the treatment of hyperacidity and of gastric and duodenal ulcer.** Amer. Jour. Med. Sci., June, 1913.

According to Cannon the control of the pyloric sphincter depends upon two factors. The presence of free acid in the stomach is the signal for the opening of the pylorus and the discharge of acid chyme into the duodenum. The presence of free acid in the duodenum, however, stimulates the sphincter of the pylorus and the pylorus remains closed until the acid in the duodenum is neutralized, after which, if there is still free acid in the stomach, the sphincter will again relax and the process be repeated. It would therefore seem possible that the symptoms of hyperacidity, and even of gastric and duodenal ulcer may be due to delayed neutralization of duodenal contents. The neutralization in the duodenum of acid contents received from the stomach is effected by the bile, the pancreatic juice, and the secretion of the duodenal mucosa. Pfaaf and Balch have shown that the flow of bile can be easily increased by the administration of ox bile by mouth.

In the past two years Palfrey has made practical application of the teachings of Cannon and of Pfaaf and Balch in the treatment of over 50 cases with symptoms which were regarded typical of the class formerly considered as hyperacidity but now, according to the teachings of Moynihan and Mayo would come under the suspicion of gastric and duodenal ulcer. The most prominent symptoms were pain and pyrosis following, after a more or less definite interval, the ingestion of food and relieved by vomiting or by sodium bicarbonate. In four cases there had been more or less recent hematemesis. In one case X-ray examination gave evidence of an extensive gastric ulcer.

The treatment was as follows: A generous diet was allowed, but patients were cautioned against imperfect mastication and overeating. Clearly unsuitable food was interdicted. The ox bile was given in specially prepared pills, each containing 0.25 gram of dried and pulverized ox bile, coated with salol to prevent dissolution in the stomach. Two or three pills were given after meals three times a day for a week, after which, as a rule, the number was reduced. The daily life of the ambulatory patients continued as before, and in the

less numerous cases in bed on account of hematemesis or other severe symptoms as little other treatment as possible was given. In practically all cases relief followed in a few days. The four with a history of vomiting blood all promptly became free from symptoms although two of them refused to give up work and were treated as ambulatory cases. The patient whose X-ray plates showed evidence of ulcer became free from pyrosis and pain, although some feeling of distress, possibly neurotic, persisted.

Palfrey does not advocate the use of ox bile as the sole treatment for gastric and duodenal ulcer. It is in the milder cases of dyspepsia of the so-called hyperacidity type that the treatment seems most clearly indicated.—(G. B. C.)

Davis, T. G. **A new laboratory test for cancer and sarcoma, also a method of separating bile acids and pigment, indican being obtained if present.** Amer. Jour. Med. Sci., June, 1913.

The test was originally used by Davis as part of a test for bile and indican only.

To 100 c. c. urine in a flask of about 150 c. c. capacity add 10 c. c. hydrochloric acid; heat over a slow fire until ebullition begins. Remove from the fire and when cool add 30 c. c. ether. Agitate occasionally by turning the flask, avoiding hard shaking, which interferes with the removal of the ether. After about 12 hours remove the ether into a clean white dish; allow it to evaporate spontaneously, when the bile acids and coloring matter will be left upon the bottom of the dish. The bile acids may be converted into salts by the addition of a small amount of 1 per cent solution of sodium bicarbonate in water and the several tests applied; and Torquay's test is recommended. Indican, if present, will be seen on the dish as a ring above the bile acids and coloring. During several years' use of this method Davis occasionally found the ether pink or even red in color and upon evaporation a more or less heavy deposit of hematin above the indican and bile constituents. He says that hematin may be present in the urine in the infectious fevers, in jaundice, in the anemias associated with intestinal parasites, and in the anemias associated with disease of the blood-making organs, but:

> By far the greatest amount and intensity of color obtained by the process described was found in the urine of patients suffering from malignant disease, cancer and sarcoma. *I have never found it absent in cases of cancer and sarcoma even when of small size or unsuspected.*

Davis hesitates to affirm the composition of this red urochrome, but he regards it as a mixture or combination of hematin and an indoxyl base, produced by the lysis of red cells and the destruction of proteid matter by the cancer cell. To this substance he gives the

name hema-uro-chrome. Reference is made to a large number of cases of malignant disease in which the diagnosis was made by the above test. In all cases the diagnosis was confirmed by histological examination of tissue obtained at operation or at autopsy. (G. B. C.) (Since the above article appeared I have used the test in a case clinically diagnosed as advanced retroperitoneal sarcoma. The ether came off deep red, and after evaporation there remained in the dish about 0.5 gram of a bright red pigment. A normal urine as a control gave no red coloring matter.—G. B. C.)

WINTERNITZ, M. C. **The pathology of syphilitic aortitis with a contribution to the formation of aneurysm.** Johns Hopkins Hospital Bulletin, July, 1913.

The association of syphilis with aneurysm was emphasized by Welch who was struck by the frequency of aneurysm among young people in the English Army. The early age at which aneurysms occurred led to the belief that syphilis produced an early and a very severe arteriosclerosis. Such authors as Virchow and Welch believed, however, that this arteriosclerosis did not differ from the usual type from which aneurysm developed secondarily.

Döhle and other workers in the Kiel laboratory established the gross and microscopic lesions which are recognized as resulting in most instances from a typical gummatous syphilitic lesion and as quite distinct from other forms of arteriosclerosis.

Chiari has given the best description and differentiation of the usual form of arteriosclerosis of the aorta and aortitis of syphilitic origin. Arteriosclerosis begins in the intima with swelling of the tissue and proliferation and fatty degeneration of the cells. The fatty change may be primary. Following these changes there is increase in the connective tissue of the intima which tends to undergo a hyaline, fatty or mucoid degeneration, necrosis or calcification. The degenerative and inflammatory changes in the media and adventitia are secondary, and are in part reparative in nature. In syphilitic aortitis the adventitia and media are most affected and the intima is only secondarily, if at all, involved. When intimal changes do occur they are less apt to undergo regressive metamorphosis. Microscopically the medial changes are most striking and consist of areas of inflammation with accumulations of round cells and vascular granulation tissue. The adventitia shows an inflammatory reaction. Giant cells may occur in the inflammatory zone. The media may undergo necrosis and the necrosed areas be replaced by fibrous connective tissue. The contraction of this scar tissue produces the characteristic macroscopic appearance described by Döhle, viz. the radiating scarred depressions and indentations of the intima.

Early writers agreed that the formation of aneurysm depended upon the replacement of the elastic tissue of the media by fibrous tissue; that the scars offered less resistance to pressure and consequently allowed aneurysms to develop in these areas. Benda, Fabris, and others more recently affirm that the mesial scars are not to be considered in the formation of aneurysm, but that aneurysm develops in the acute stage of these specific granulomata when there is sufficient destruction of arterial wall. Fabris believes that these granulomata begin in the periadventitial connective tissue and in the adventitia, from which they gradually involve the media and terminate in necrosis of the media and intima, and that in all probability the saccular dilatations occur at this time.

Winternitz cites a case with the microscopic pathology which confirms the view of Benda and Fabris.—(G. B. C.)

WHIPPLE, G. H., MASON, V. R., AND PEIGHTAL, T. C. **Tests for hepatic function and disease under experimental conditions.** Johns Hopkins Hospital Bulletin, July, 1913.

Attention is called to three tests which may be of value.

Lipase can be demonstrated in the serum or plasma of normal animals or human beings in rather constant amount. Destruction of liver tissue, especially if associated with necrosis, will be accompanied by an increase in the serum lipase.

Fibrinogen is also normally present in blood plasma. Whipple and Hurwitz have shown that fibrinogen falls markedly with liver injury, thus accounting for the well-known hemorrhagic tendency in yellow atrophy of the liver, phosphorus and chloroform poisoning, yellow fever, etc.

Phenoltetrachlorphthalein is a drug which is excreted by the liver cells into the bile. Experiments have shown that only 10 to 15 per cent of the drug is lost from the time it is injected intravenously until it is poured by the liver in the bile into the duodenum and normally 60–65 per cent of the amount injected may be recovered from the feces. This indicates a remarkable secretory activity and specificity of the liver epithelium. Rowntree suggested its use in abnormal hepatic conditions. A preliminary series of experiments on dogs whose livers had been injured by various means showed a remarkable decrease in the phthalein output during the period of liver injury. After that Rowntree, Hurwitz, and Bloomfield applied the test to patients in the wards. Any agent which injures the liver parenchyma or interferes with its functional activity will cause a decrease in phthalein output in the feces. Acute liver injury is also associated with the appearance of phthalein in the urine.

The authors offer this only as a preliminary report but feel certain that phenoltetrachlorphthalein offers promise of a functional liver test. They promise an early report on the clinical studies with details of drug preparation, injection, and collection.—(G. B. C.)

SURGERY.

H. C. CURL, surgeon, and R. A. WARNER, passed assistant surgeon, United States Navy.

ANTONIO, PERASSI, LIBERO DECENTE, TENENTE-COLONELLO MEDICO. **Hernial formations caused by deficiencies in the peritoneum.** Giornale di Medicina Militare, Anno LX, Nov.–Dec., 1913, Fasc. XI–XII, p. 824.

The author found, from personal statistics of his cases, that out of 100 recruits operated on for hernia before conscription, 8 made an imperfect recovery. According to his studies during 9 years of surgical practice, such recurrences are often due to pathological processes on the part of the peritoneum, consisting in chronic inflammations, superinduced, not so much by operative procedures, as by conditions peculiar to the individual, or else caused by the extension of inflammatory conditions in neighboring glands or other unknown agencies. In hernial formations of this character, the ordinary hernial sac is absent and the visceral contents, if any, are in contact with a newly formed pseudo-membrane, very different from the elastic sac of an ordinary hernia. Such a sac has no neck and the visceral parts contained in its cavity are not very likely to pass obliquely through the abdominal walls or through the canal, consequently the conditions for strangulation are absent.

Antonio, therefore, recommends no surgical intervention in all such cases, except for notable functional disturbances or painful manifestations, because no improvement in the conditions could be expected to follow further operations.

In case of crural hernias of soldiers, the author has often limited his operations to removing the pedunculated sac and to the occlusion of the crural canal by a few sutures, bringing the margins of it together, with perfect and enduring results.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

LANE, W. A. **Chronic intestinal stasis.** Surg. Gynecol. & Obstet., June, 1913.

The author is recognized as the foremost authority on the subject on which he writes. His views and deductions are clear, logical, and to the point.

The gastrointestinal tract is composed of several portions, of which each performs its separate function; it is a living, sentient drainage scheme from which nutrient material is picked up by

absorbing vessels and into which certain organs discharge their contents. In some portions organisms thrive normally, and in others the presence of these same organisms produces poisonous products which that portion of the tract is unaccustomed to deal with. These poisons being absorbed damage the tissues of the body and cause degenerations. Any delay in the passage of the contents of this drainage scheme has a threefold result on the organisms: they multiply, they extend beyond their normal habitat, and extraneous strains are developed. The organisms may extend along the ducts which open into the drain pipe, and they or their products, carried along in the blood stream, may affect distant organs—for example, the kidneys, liver, and heart—producing progressive degenerative changes.

The author quotes Carrel's work on the growth of tissues, showing that it is possible to give immortality to tissues if they are properly drained as well as properly supplied with suitable nutrition.

The changes undergone in intestinal stasis by the ductless glands opens up a large field. Patients who have shown pigmentation of the skin for years as a result of the so-called Addison's disease will resume their normal color in a few days upon the removal of the large bowel, where this has been at fault. The low temperature of the extremities, depending on this same condition, has been relieved in a few hours by the same procedure.

The nervous system is also, at times, markedly affected by intestinal stasis. A case of tic douloureux of eight years' standing was immediately relieved by short circuiting the large bowel, on account of marked stasis.

The diseased conditions found in the thyroid gland, as shown in exophthalmic goiter and adenomatous growths, are traceable at times to intestinal stasis, and can be relieved by operative procedures to insure drainage of the intestinal canal.

There are several sites where kinking can occur. The first is at the duodeno-jejunal junction. Normally the vertically placed termination of the duodenum is firmly secured to the root of the transverse mesocolon. From this point the jejunum curves gently and allows the contents to pass freely from the duodenum onward. If, however, there is any marked stasis of the ileal effluent the commencement of the jejunum is pulled vertically downward and a kinking of the bowel results at this point. If the condition of the obstruction be advanced, a new mesentery, running from the outer aspect of the jejunum upward and outward, is formed. At first this acquired ligament may be useful, but finally it obstructs just as do the ileal bands. The bowel can be held up and kinking prevented by sewing the jejunum to the under surface of the transverse mesocolon or by a gastroenterostomy. Both of these procedures

support the bowel, prevent kinking, and favor free passage of the intestinal contents. If, as so often occurs, there is a stasis of the small intestine from obstruction of the end of the ileum, the permanent relief of the condition can only be accomplished by removing the second obstruction, either by releasing the bowel by division of bands, removal of the appendix, or, if necessary, a short-circuit operation or complete removal of the colon.

Very often the point of greatest difficulty in the passage of material contents along the gastrointestinal tract is through the last few inches of the ileum. This is often the case when the cæcum has been securely fixed by adhesions. In one case the bismuth was delayed in the terminal coil of the ileum for 85 hours. This was a case belonging to the static variety as opposed to the obstruction varieties. Diagnosis in these cases can be made with accuracy by X-ray examination.

The author believes that a great deal of absorption of poisonous material takes place in the small intestines, and does not agree with Metchinkoff and others that the whole trouble is confined to the large bowel. The stasis of the small intestine is, at times, secondary to stasis in the colon. If the cæcum did not become loaded as a part of colonic stasis, obstruction at the end of the ileum would not develop, consequently infection of the contents of the small intestine by extraneous organisms would not occur, the duodenum would not be blocked by the drag of the small intestine obstructed at the end of the ileum, the mucous membrane of the duodenum would not inflame and ulcerate, and the biliary and pancreatic ducts would not be infected and obstruction to the outflow from the stomach with all its sequelæ would not occur.

Lane believes that the extraordinary improvement that results from short circuiting and from disconnection or removal of the colon is due largely to the fact that prompt evacuation of the contents of the small intestine into the pelvic colon prevents infection of the bowel contents.

Instead of restricted diet, intestinal antiseptics, massage, colonic irrigations, etc., Lane advocates the use of liquid paraffin, preferably the Russian brand, "Stearnol," on account of its purity, 1 ounce one-half hour before meals, in cases of stasis that are not operative. The paraffin goes through the bowel unchanged, the bowel movements become much less bulky on account of the lessened number of organisms. He also advises a spring support to the lower abdomen held by means of a truss arrangement from behind. This support prevents the accumulation of fecal matter in the cæcum and ileum and supports a prolapsed transverse colon, and also makes pressure in the veins of the splenic area and keeps the brain better supplied with blood.

At present, Lane, in cases of kinking of the ileum, in which the acquired ligament is extensive, and where its division would leave large raw surfaces, and when the freed intestine would probably fail to transmit its contents, leaves the kink alone and divides the ileum immediately below the last kink, and anastomoses it to the pelvic colon. Again, where the large bowel is static, and especially if the abdomen is lax, he removes the entire colon, for he feels that the risk of its removal is small in suitable cases. If the removal is attended with grave risk from the state of autointoxication he performs a preliminary short-circuit operation.—(R. SPEAR, SURGEON, U. S. NAVY.)

LEARY, T. J., M. C., U. S. A. **Surgical method of clearing up chronic typhoid carriers.** Jour. Amer. Med. Assoc., April 26, 1913.

Leary reports two cases of typhoid carriers cured by removal of the gall bladder. The important features of each case are given in brief.

Case 1. Age, 27; no history of typhoid: chronic biliary fistula resulting from drainage of gall bladder; typhoid bacilli in discharge from fistula and also in feces. Removal of the gall bladder was followed by disappearance of typhoid bacilli from the feces.

Case 2. Stools contained typhoid bacilli, and repeated administrations of typhoid vaccine did not improve the condition, nor did treatment with buttermilk, calomel, sodium sulphite, hexamethylenamin, salol, or ipecac. The gall bladder was removed, and the bacillus disappeared from the feces.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

ESTES, WM. L. **An analysis and study of 724 major amputations.** Annals of Surgery, July, 1913.

The author's opportunity to do major amputations has been much greater than that of most surgeons, even those associated with large city hospitals, and the conclusions drawn from his extensive experience are interesting and valuable.

Among the conditions which require the amputation of an extremity for trauma are:

1. Evulsion of a limb, of course, admits of no question.
2. Annular crushes (where all tissues are crushed through the whole of a limited transverse section of the limb).
3. When soft tissues under the skin, as well as bone, have been badly squeezed by heavy pressure, though skin is intact.
4. If bones are comminuted beyond a distance of 6 mm. and soft tissues immediately about bone badly lacerated.
5. Circular lacerations involving chief blood vessels and nerves.

In general, longitudinal and oblique lacerations admit of conservative treatment, while circular ones are apt to require amputation.

Muscular lacerations should receive less consideration in estimating condition of an injury than great injury to an extensive area of skin.

A severed nerve in a compound fracture may often be sutured. Take into consideration the trade or employment of the patient in determining as to amputation; if in doubt, be conservative.

The time for amputation is sometimes difficult to determine, but ordinarily amputate as soon as patient's condition will permit.

In no case operate when the blood pressure is very low. One may wait 48 hours, if necessary, to secure reaction.

If gas bacillus or streptococcus is present, operate at once.

In all cases of delayed amputation it is absolutely necessary to control all hemorrhage.

When it is fully decided to amputate, put on elastic constriction, when practical, over the crushed tissues.

A Martin's rubber bandage applied from the fingers or toes upward and over the crushed tissues to the margin of uninjured tissues is best in case the limb has not been severed.

It is very important never to remove the elastic constrictor applied to control primary hemorrhage until limb has been amputated.

This saves time, is clean, prevents microorganisms involving sound tissue, and stops all hemorrhage.

Points of selection for amputation.—1. Amputate as low as possible in the upper extremity.

2. Leave as much as possible of the foot. Hay's and Chopart's amputations are satisfactory when anterior and posterior tendons have been united so as to keep up the balance of the extensor and flexor groups. Pirogoff's and Syme's amputations have not proved satisfactory.

3. Amputations of the leg whenever possible should be done through the lower third; very rarely through upper third, as in that case a knee-joint amputation is better.

4. Knee-joint amputations are very useful, but the articulating surface should be sawed off to obliterate the intercondylar groove.

5. Lower and middle third thigh amputations are satisfactory, but hip joint had better be substituted for upper third amputations.

Technic.—1. Ether by drop method.

2. Rubber tourniquet over lacerated tissue up to site of amputation and securely fastened by muslin bandage held in place by pins if necessary.

3. Clean limb with turpentine, followed by alcohol.

4. Tincture of iodine, full strength, over entire site of operation.

5. After elevation of limb, another rubber tourniquet above place of amputation.

6. Dry rubber gloves and respirator to be worn.

Flaps.—The points of special importance under this heading are:

1. Osteoplastic flaps are seldom used, as they require more time and are usually unsatisfactory.

2. Flaps are always formed from without inward.

3. Usually a periosteal cuff is raised.

4. Avoid "noci associations" by blocking the nerves with local injections of cocain or novocain.

5. Hemorrhage is to be most carefully controlled by ligating or twisting every bleeding part.

6. In shoulder, upper thigh, and hip amputations the gradual dissection method is used; this provides for tying all main trunks and securing all vessels as they are met, as in breast amputations.

7. In forearm, anteroposterior flaps with posterior one-quarter longer. In arm, circular or modified circular. At shoulder joint, also, anteroposterior flaps.

In lower leg, anteroposterior flaps, but not the Teale method.

Other parts of leg, lateral flaps. At knee joint a long anterior and short posterior flap method is preferred; the patella may or may not be removed, according to condition of case.

In the thigh, anteroposterior flaps.

Under the principles given above the mortality rate has decreased markedly, especially in double mixed amputations.—(H. C. C.)

MURPHY, JOHN B., M. D. **Arthroplasty.** Annals of Surgery, May, 1913.

This very important and interesting article is really a review of the experiences and development of this difficult class of work by the one who, from his achievements, has the right to be called the "Great master of bone surgery."

The subject of bony types of ankylosis only are considered and the main principle of the operation of securing the formation of a new joint consists in interposing between the ends of the bones, after their separation, some material which will prevent the recurrence of bony union, the best being a pedicled flap of fat and fascia lifted from the tissues in the neighborhood of the joint, or if that is not possible, then a detached flap of fat and fascia from the trochanteric bursal portion of the fascia lata may be transplanted between the ends of the bones. Complete normal anatomic restoration is necessary to secure a useful as well as movable joint, and enough bone must be removed and soft tissues freed to prevent tension and pressure.

Dr. Murphy considers that the types of arthritis which lead to the varieties of ankylosis are practically all direct metastases from foci of infection elsewhere in the body. This type of so-called rheumatism is always a metastatic arthritis.

In order to secure successful results, absolute asepsis must be secured, only clean instruments and sponges must be allowed to touch the wound, and not even the gloved hand must come in contact with the wound.

Where osseous union has existed, it is important to separate the bones in the normal line of union as nearly as possible. All bony prominences that may impinge against other bones should be removed, as, for instance, the coronoid process of the ulna and the tip of the olecranon. The soft parts are to be liberated most thoroughly. The interposing material, and this is a point that can not be emphasized sufficiently, must cover the entire articular surface of the bones, being attached, however, to only one bone.

As the flaps used in arthroplasty have but slight vascularity, they do not perish readily, as they receive their nutriment by osmosis from the bones while a new circulation is developed in the flap.

The author is "more fearful of doing an arthroplasty on a joint that was primarily tuberculous than on any other type of ankylosed joint." "The process of repair is slower, the tendency to blood oozing from traumatized tissues is greater, exposing these cases to the danger of infection for weeks."

The details of arthroplasties on hip, knee, shoulder, elbow, and smaller joints are described, but for lack of space that of the hip only will be given in this review.

The hip.—The joint is exposed by one of two incisions; either a horseshoe flap, base upward, surrounding the trochanter, or a 5-inch straight incision from below and to outer side of trochanter toward the anterior superior spine of the ilium.

On the first incision the flap, consisting of skin, superficial fat, and fascia lata, is raised.

The great trochanter is separated from the bone by a chain saw, the line of incision being downward and outward from the fossa.

The obturators and pyriformis are divided and transfixed with sutures for subsequent approximation.

The joint is exposed, the capsule is incised around the neck and pulled upward to the margin of the acetabulum without, however, freeing it from its attachment to the margin.

The head of the femur is chiseled away from the acetabulum, is disarticulated, and shaped by the use of an ingenious cup-shaped end mill into a smooth, globular surface.

The acetabulum is similarly reamed out with a large burr especially constructed for the purpose.

The main reliance for obviating the recurrence of the ankylosis is placed on the flap of the deflected fascia lata, which is made by splitting the original U-shaped flap.

This flap, of superficial fat and fascia, is drawn into the joint, passed over the femoral head, and sutured to the acetabular margin or to the remnant of the capsular ligament.

When the head is placed in the acetabular cavity this flap also serves as a lining for the cavity and reenforces the capsular ligament (which has been allowed to drop into and line the acetabulum), though the capsule is used mainly for the purpose of preventing a locking of the joint by the formation of exostoses on the acetabular rim.

The obturator and pyriformis muscles are reunited, the trochanter replaced and secured by driving in a 6 or 8 penny nail along the axis of the neck of the femur. The soft parts are closed and the field of operation freely dusted with bismuth subiodide.

The wound is sealed with collodion gauze and a large pad of 5 per cent moist phenolized gauze is placed over the hip, extending 6 inches beyond the line of incision on either side.

The leg is dressed in an abducted position with a Buck's extension and a 20-pound weight. The other leg is also splinted to prevent the patient from unconsciously throwing his body to the opposite side and really abducting the leg not operated on. With both legs splinted and abducted it is impossible for him to change his position and makes certain the desired abduction of the operated leg.

After 7 to 10 days passive motion is given daily, splint is removed after 3 or 4 weeks, when patient is allowed to use crutches.

Several interesting illustrative cases are given. Dr. Murphy's results have been most excellent.

A somewhat similar procedure is carried out in cases of ankylosis of knee, shoulder, elbow, etc., in all of which remarkably satisfactory results have been secured.

The author urges that only experienced surgeons, thoroughly familiar with technique and trained by experimental work on the cadaver and on animals, should undertake this difficult work.—(H. C. C.)

TROUT, H. **Proctoclysis—An experimental study.** Surg., Gyn. and Obstet., May, 1913, Vol. XVI, No. 5.

The preliminary report of this work first appeared in February, 1912, and was based on the observation of nearly 1,000 cases. The observations have been continued, so that now over 2,000 cases of all varieties of operations which permit the use of proctoclysis have

been studied. The alternate use of normal salt solution and tap water emphasized their respective differences.

Replies from 232 hospitals in this country regarding the method of preparing their salt solution and reasons for using it in preference to tap water have also been studied. The method of preparation varies from the most elaborate and exact use of the potassium, calcium, and sodium salts to the simple and haphazard mixing of two teaspoonfuls of table salt in a quart of water. The most frequent reason given for its preference to tap water is isotonicity with the blood.

Apparently many cases have forced into them, in a weakened condition, as much salt as a healthy man consumes as a condiment in a month.

Trout strongly advocates the use of plain tap water, after the method of proctoclysis of Murphy, except to use a soft rubber catheter instead of the hard rubber nozzle, as patients are frequently unaware of the presence of the former. His conclusions are based in its favor as follows: (1) Thirst is much better controlled by tap water. (2) The kidneys are relieved and postanesthetic albuminuria lessened, whereas salt solution increases the latter. (3) The patient never complains of a salt taste. (4) A third more water is absorbed, and but one-half the amount of water is required by mouth to relieve the thirst. (5) Edema never occurs.

As yet no difference in kidney function by the phenolsulphonephthalein test has been observed.

Death in two cases from physiological salt solution has been reported in the literature, and there are two deaths recorded from the use of the " stock " solution given in mistake for the physiological.—(R. A. W.)

TOREK, FRANZ. **The first successful case of resection of the thoracic portion of the œsophagus for carcinoma.** Surg., Gynec. and Obstet., Vol. XVI, No. 6, June, 1913.

Torek takes issue with many prominent surgeons who are authorities on this branch of surgery in the view that carcinoma of the œsophagus is operable only when high up near the neck, or so low that anastomosis with the stomach after resection is practicable. Carcinoma of the middle third, the most frequent site, has been considered out of the reach of the surgeon on account of (1) its anatomical inaccessibility, and (2) the fact that the vagi are in such intimate relation that injury to them in the dissection would result in instant cardiac failure, and (3) leakage from the upper œsophageal stump would result in pleural infection from contained saliva.

Torek, on March 4, 1913, successfully performed resection of the middle third of the œsophagus on a woman 67 years of age for carcinoma which had attacked the tube just below the inferior border of the transverse aorta and extended downward about 1¾ inches. The patient had had at some time previous to operation a gastrostomy performed and was being nourished through the false mouth. Access was obtained by an incision through the whole length of the seventh left intercostal space, extending upward across the seventh, sixth, fifth, and fourth ribs, the ribs being cut at the tubercles.

Adhesions between lung and parietal pleura were encountered and separated, the lung being freed to the apex. The œsophagus below the tumor was lifted from its bed and the vagi drawn aside. Freeing of the vagi was continued up over the site of the tumor and though division of a few small branches was necessary no collapse occurred.

Ligations of thoracic branches of the transverse aorta were necessary and the dissection of the œsophagus from transverse aorta accomplished by drawing the latter upward and forward.

The œsophagus was finally freed from a point about 1 inch above the diaphragm all the way to the neck. At a safe distance below the tumor it was divided with the cautery between double ligatures and the lower stump twice invaginated with purse-string sutures; the tumor still remained in the upper section. An incision was now made at the anterior border of the left sterno-mastoid down to the œsophagus and the freed portion of the latter was drawn out through it. At this point the thoracic wound was closed without drainage, leaving the patient with the œsophagus still containing the tumor delivered through the neck wound. The skin was now freed by tunneling from this point to the second intercostal space, where a transverse incision was made. The œsophagus was then drawn under the free skin through the tunnel and delivered from the transverse wound. The cancer was removed by severing the tube at the skin edge and the cut edge was sutured to the skin.

Wound in the neck closed. Operating time 2 hours and 43 minutes.

The patient for the first eight days was fed through the gastrostomy. After that time one end of a rubber tube was inserted in the end of the œsophagus and the other end in the gastrostomy wound and the patient was able to chew to a fluid state and swallow her food.—(R. A. W.)

CRILE, GEORGE W. **The kinetic theory of shock and its prevention through anoci-association (shockless operation).** Lancet, July 5, 1913.

Conclusions are based on extensive animal experimentation and on the results obtained when complete nerve-block is obtained during, and for a period after, operations on human beings.

Throughout the body innumerable receptors are stationed for the receipt of the various impulses which are to be transmitted to appropriate brain centers. On arrival at this center the impulse gives rise to a stimulation in the nerve cell whereby certain chemical substances there contained are broken down at the expense of the brain cell and potential energy is converted at once into kinetic energy with resultant performance of function of the part or organ enervated therefrom. The receptors are of two classes—" beneceptors," where their function is to receive and to forward centrally those stimulations which carry on the normal requirements of the body; and " noci-ceptors " when their function is to recognize and transmit to the brain those harmful and nocuous stimulations requiring body adjustment to escape and insure well being. The result of the receipt, transmission, recognition and resulting conversion of potential energy within the central cell into kinetic energy is motor activity generated to escape the harmful irritation, or trauma, and the cycle is noci-association. Anoci-association is the introduction of a " block " between noci-ceptor and central brain cell, thereby interrupting communication between the two.

The author considers the following factors in the production of shock:

(1) At present there is no anesthetic that produces more than unconsciousness and loss of voluntary muscular action when administered to produce surgical anesthesia. A portion of the brain remains awake and in this portion are the centers of cardiac, respiratory, and vaso-motor action which discharge energy in response to traumatic stimuli. Trauma during such anesthesia, if of sufficient degree, wears out these central cells and shock results. Experimental proof: Dogs, whose spinal cords have been cut at the first dorsal segment, after two months, show a return of spinal reflexes, but their abdominal cavities and hind extremities have no direct connection with the brain. Long continued and severe trauma to the abdominal viscera and hind extremities does not produce shock in such animals and the brain cells show no change. Control animals under inhalation anesthesia show marked cell change typical of shock when subjected to a much less degree of trauma.

(2) Anesthetic per se: It is assumed that brain cell changes are due to oxidation and it is experimentally shown that less change occurs under nitrous oxide (which depends to a much greater degree on interference with oxidation for anesthetic effect) than under ether. Experimental proof: When an animal under ether is traumatized equally with an animal under nitrous oxide it is found that the latter shows about three times less change in the brain cells, and the fall of blood pressure is two and half times less.

(3) Influence of internal secretions: There is no evidence that internal secretions affect the brain cells or produce shock. Experimental proof: A free interchange of blood was obtained between two dogs by anastomosis of the jugulars on the one hand and the carotids on the other. One dog was traumatized, and after death its brain cells showed the characteristic changes of shock. The brain cells of the untraumatized dog showed no change whatever though the blood from the injured animal had been flowing through it for two hours.

(4) Anemia of the brain: This is a factor in shock, but it is secondary. Experimental proof: If the blood pressure in a traumatized animal be kept up by furnishing it as required with transfused blood the brain changes are of less degree.

(5) Absence of noci-ceptors: In certain parts of the body nociceptors do not exist, for example, the brain. Under the theory of noci-association injury to such a part should not produce true shock, though collapse through interference with medullary centers may certainly occur. Experimental proof: Under combined local and general anesthesia a dog's skull was cut away and one hemisphere slowly destroyed. The other hemisphere did not show the changes of shock in the cells.

(6) Fear alone may produce the characteristic changes in the brain and the typical symptom-complex of shock. Experimental proof: Rabbits frightened by dogs, but not chased or injured, show typical signs and symptoms of shock, with the characteristic cell changes. Emotional stimulation shows the same changes as physical injury.

(7) Influence of other causes: A normal animal withstands more trauma than one subjected to additional influences which cause morphological changes within the brain. Such influences are anemia, infection, toxemia, physical exercise, senility, starvation, exophthalmic goiter, fear, worry, and injury.

(8) Type of trauma: Tearing, crushing, and bruising produce more shock than clean-cut wounds. Intensity is dependent on type.

(9) Effect of drugs: Morphine and scopolamine cause no changes in the brain cell, but they prevent psychic shock and diminish traumatic shock.

The application of the practice of anoci-association in abdominal operations:

(1) Morphine grs. 1/6, scopolamine grs. 1/150 hypodermically one hour before operation. This is a "block" to psychic stimulation.

(2) If local anesthesia alone is used, novocain 1–400 by progressive infiltration.

(3) If general anesthesia is selected, nitrous oxide, with or without ether, is used.

(4) As soon as the patient is unconscious the skin and then the subcutaneous tissue is infiltrated with 1-400 novacain and immediate local pressure over the area is made with the hand. Incision through anesthetized tissue. The fascia is thus exposed, and it and its underlying muscle are infiltrated, pressure applied and then incised. Posterior fascia and peritoneum are then infiltrated, pressed and incised. If the "blocking" has been complete there is no increased intra-abdominal pressure, no expulsion of viscera and no rigidity.

(5) Evert the peritoneum and infiltrate it about the site of the proposed suture line with one-half per cent quinine and urea hydrochloride. This forms a "block" for several days and prevents post operative shock from irritation arising from the sutures.

(6) Easy exploration through relaxed walls is now obtained, and in the absence of cancer or acute infection the following regions may likewise be blocked: The meso-appendix, mesentery, broad and round ligaments and the base of the gall bladder. Noci-ceptors are absent from the stomach and intestines so that operations upon them, if their attachments are not pulled upon, may be performed without further blocking.

Application in exophthalmic goiter: *Ligation* is performed without moving the patient from the bed. Nitrous oxide and oxygen may or may not be used, but the brain is, in either event, protected by a complete local blocking with novacain during operation, and a complete infiltration of quinine and urea hydrochloride at the close. In *lobectomy* the patient is anesthetized with nitrous oxide in bed. Fictitious anesthesia may have preceded the real anesthesia, and the patient relieved from the psychic strain under the guise of inhalation treatment. When anesthetized he is carried to the operating room and the division of all tissue preceded by novacain infiltration. Before closing the wound complete quinine and urea infiltration is practiced. The patient is then transferred to his room with no impression of the operation in his brain in conscious or subconscious mind.

Results: No shock, no post-operative pain, absent or reduced gas pains in abdominal cases, no painful scars, no nervousness, and no reduced efficiency through loss of energy. Aseptic post-operative fever is absent or reduced, and in Grave's disease there is no hyperthyroidism.

In regard to "painful scars" Crile postulates that their real site is within the brain, due to a low threshold produced by trauma.—(R. A. W.)

C. N. FISKE, surgeon, and R. C. RANSDELL, passed assistant surgeon, United States Navy.

HOUSTON, A. C. **Search for pathogenic microbes in raw river water and in crude sewage.** 9th Research Report. Metropolitan Water Board.

The author suggests as an alternative title for the present report "Where is the Typhoid Bacillus?" and answers the question as follows: "The home of the typhoid bacillus is not so much in impure water or even in the crude sewage from a large community as in the 'factories' of disease as exemplified by the 'carrier' case."

Owing to the discovery of typhoid carriers the question of accident has assumed a new and even deadly significance. We know now that a relatively gross pollution derived from the sewage of a large community may be less dangerous than traces of contamination coming from a single individual of unknown health history. If the danger unit is a carrier, and some authorities estimate that three or four out of every 1,000 persons are in this condition, his discharges may be 10,000 times more infectious than crude sewage volume for volume. The danger of polution, volume for volume, would seem to rank as follows: (1) The carrier unit, the concentration and factory of disease—the genesis of epidemics; (2) the unit person of unknown health history who may be in the position of (1) and is therefore, in a potential sense, placed second but who in the great majority of cases, one would hope, is an almost negligible factor; (3) the collection of individuals on a large scale exemplified in a contaminating sense by the sewage of a large town. Here the dangerous carrier element being reduced by dilution to normal proportions less than one typhoid bacillus per 0.001 c. c. of sewage might be anticipated to be present on the basis of the foregoing observations.

Attention is drawn to the fact that in American cities the typhoid death rate compares very unfavorably with European cities, as the following selected figures show.

	Population.	Death rate per 100,000.		Population.	Death rate per 100,000.
Edinburgh	320,000	1.3	Paris	2,750,000	5.6
Dresden	550,000	2.2	Boston	670,000	11.3
Berlin	2,000,000	2.9	New York	4,766,833	11.6
London	7,280,000	3.3	Philadelphia	1,549,008	17.5
Vienna	2,000,000	3.8	Washington	331,069	23.2
Hamburg	950,000	4.1	Minneapolis	301,408	58.7

American sanitarians especially attribute a considerable proportion of their total typhoid fever cases to the consumption of impure water; but in the author's opinion the part played by water supply

in causing endemic typhoid fever is apt to be exaggerated, especially as it can be shown by calculation that the customary draft of water (½ pint) of a satisfactory or perhaps even of an unsatisfactory water supply does not contain 1,000 excremental bacteria, and therefore can not be expected to contain even a single typhoid bacillus. In cases, however, where the pollution is from the urine of a typhoid carrier, there may be no fecal bacteria, yet an abundance of typhoid bacilli.—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

COOK, F., and PEMBREY, M. S. **Observations on the effects of muscular exercise upon man.** Jour. of Physiology, 1913, Vol. XLV, No. 6, 29–31.

The authors emphasize the far-reaching effects of muscular exercise upon men and animals and present an elaborate paper upon the results of observations of the respiration, pulse, and temperature of healthy men before and after exercise. The objects in view have been the investigation of muscular dyspnea, "second wind," and training. The conclusions are summarized as follows:

During rest the alveolar air of healthy men had the following composition: Means of 50 observations upon 10 men, 5.57 volumes per hundred carbon dioxide and 14.89 oxygen; maxima, 6.11 and 15.59; minima, 4.87 and 13.91, respectively. The respiratory quotient varied from 1.03 to 0.75, with a mean of 0.90. Directly after muscular exercise the alveolar air had the following composition: Means of 42 observations upon 10 men, 6.52 volumes per hundred carbon dioxide and 14.33 oxygen; maxima, 8.13 and 16.08; minima, 4.95 and 12.80, respectively. The respiratory quotient varied from 1.37 to 0.81, with a mean of 1.

During muscular dyspnea the respiratory quotient affords no definite indication of the metabolism, for the vigorous ventilation of the lungs washes out carbon dioxide.

The administration of oxygen is of value only when the conditions are pathological. Under ordinary conditions of work the amount of oxygen in the alveolar air is less affected than that of carbon dioxide.

The differences in the pulse rate in healthy men during rest range from 45 to 90 per minute.

The pulse of the trained man has a slower rate at rest, a wider range in response to muscular work, and a more rapid recovery after exercise.

Directly after exercise the pulse rate of a healthy man may be as high as 180 per minute.

"Second wind" appears to be an adjustment of the respiratory and circulatory systems to the demands of the muscles for an ade-

quate supply of blood. Carbon dioxide is the chief factor in effecting the accommodation.—(E. W. BROWN, PASSED ASSISTANT SURGEON, U. S. NAVY.)

HILL, L. **On the physiology of the open-air treatment.** Jour. R. A. M. C., Vol. XXI, No. 2, Aug., 1913.

Following Prof. Bulloch's lecture on tuberculosis infection, in which was considered Hamburger's communication that 95 per cent of the children of Vienna aged 15 are infected, and usually by aspiration through the air and respiratory tract rather than through the intestines, Hill has once more attempted to clarify our more recent views as to the factors for health and disease in ventilation and exercise.

We are reminded that people complain in crowded places of the closeness and warmth of the air rather than lack of oxygen, excess of carbonic acid or presence of organic poisons from human exhalations. It has already been shown that neither of these conditions nor their combination continue to produce oppression if the vitiated air is kept in circulation, especially if the wet-bulb temperature is not excessive. It is claimed that there are no valid grounds for supposing that the air contains volatile protein or other noxious organic substances, as urged by Brown-Séquard, d'Arsonval, Rosenau, and Amoss and others, whose findings are accounted for by mucin in saliva droplets; neither can unpleasant odors from buccal, cutaneous, or intestinal emanations cause distress other than by suggestion through the sense of smell. The idea of saliva droplet spray infection of the Fluegge school is accepted particularly for pneumonia, tuberculosis, and the numerous bacterial forms of colds.

The entire lecture could be presented to all thinking laymen with great profit, as indeed it is now reprinted from the Lancet and other European journals. A few of the paragraphs are here quoted with certain omissions. The laboratory and practical proofs omitted seem to be quite sufficient.

INFLUENCE OF WARM CONFINED AIR ON NASAL MUCOUS MEMBRANE.

Dr. Muecke and I have lately been examining the nose to see what happens to the mucous membrane in a warm atmosphere. Of course it is quite clear that infection occurs in certain states of weather; that colds run around when there is a sudden change to cold moist weather. We wanted to see if there was any reason behind that. When people are away at the seaside or on the mountains, where they are exposed to any weather, rain and wind, and live in the open air, they get no colds. Children who are out on the shore paddling and exposed to weather and wind and all that kind of thing never get any colds. The moment they come back to crowded places and chill autumnal weather they get them in the schools and these colds run around and everybody catches them.

What is the reason for all of that? There must be some fairly simple condition which causes that. There is infection in crowded places to begin with. But, then, at the seaside in little cottages and lodgings people crowd together in the evenings, and they would infect each other if a cold were going around, but the "cold" does not go around in those conditions. It is when you get the cold autumnal winds and you begin to shut up the windows and light fires and start heating apparatus, and so on, that the "colds" begin to come back.

This [normal cheery red] is the condition of the nose as seen under normal conditions when a person comes in from cool surrounding, a cool atmosphere, or the outside air. The mucous membrane is shrunk; it is taut. If you touch it with a probe you can not pit it; it is not congested, and there is very scanty secretion. That [deep raspberry turgescence] is the effect of going into a heated chamber, where the air is at a temperature of about 80° F. and pretty well saturated with moisture—conditions such as exist in crowded places, meeting houses, or ballrooms. The mucous membrane of the nose becomes turgid with blood and is covered with a very thick secretion and the tissues are all swollen. You can push the probe into the tissues and depress them, and it does not come out for some little time, showing how boggy it is. The airway is so diminished that if you have got a spur or anything of that kind you can not breathe through the nose when you get into these hot conditions. That [pale red plum glistening odema] is the effect of putting on a fan in the hot room and whirling the same air. The air so whirled by the fan will bring the nose to more like the conditions shown [normal] and lessen the constriction of the air channels. That [pale, with slight oedema] is the effect of going out in the open air for a few minutes, the cool open air last month, of winter—not very cold, but cool open air. The blood goes out as the vessels contract, but one still finds that the mucous membrane is boggy, that it pits, and that there is a great deal of this thick secretion upon it. You see the conditions are such when you go into these hot places that the mucous membrane becomes greatly swollen; there is a great deal of tissue lymph in it, a great deal of thick secretion; the exhaled bacteria that are thrown in masses on it are caught in the thick secretion. Then when you come out into the cold again the blood vessels shrink up so that heat should not be lost from the body, and you are left with a nose containing thick secretion and a great deal of tissue lymph—a medium for the growth of bacteria, while it loses the blood which defends it from infection; whereas if you never go into a hot room at all you have a nose in good condition, taut, and with a scanty secretion, and the organisms have not got a hold on the mucous membrane and there is nothing for them to grow in. When the mucous membrane is kept taut and the flow of blood is rapid the inhaled air is warmed up quickly and moisture evaporates from the nose so as to saturate this air at body temperature; that means more plasma comes out of the blood vessels, and this contains the immunizing substances. The ciliated cells are well supplied with plasma, and they lash well and the offensive bacteria are kept out. But when you come back to this condition where you have much secretion and boggy tissue, and the blood has been shrunk out by vasoconstriction, then you have got a suitable nidus for bacteria to grow in.

THE EFFECT OF OPEN AND CONFINED AIR UPON METABOLISM.

I maintain that the whole of the bad influence of confined quarters and the good influence of open air is a question of the heat and moisture of the atmosphere. The evidence that heat and moisture of the atmosphere have a physiological effect, a potent, a tremendous effect, upon the metabolism of the body is as strong as anything can possibly be.

If the atmosphere is cool and moving it will continually carry heat away from the skin. It will keep the vessels of the skin contracted; the blood will be driven into the viscera, where it will become metabolized, not drawn into the skin, but driven through the viscera and through the brain, where it is required. Moreover, the cool moving air acts upon the skin and stimulates the nerves, and the cutaneous nerves have a very great influence upon our comfort. When we get into confined places the air becomes monotonous; it is not moving; we get a monotonous, uniform temperature of the skin; the skin gets hot, flushed with blood, and the temperature of the skin gets almost the same as the temperature of the body. Instead of being considerably lower than the temperature of the viscera, it gets to almost the same point, and if the room is very hot it gets quite up to that point. The sensory nerves are no longer stimulated because there is no change. If, on the other hand, the air is continually moving, sometimes blowing, sometimes not blowing, it is continually stimulating the nerve endings of the skin and the nervous system generally, and it rouses us to activity, for in order to keep warm we have to use our own body furnace, and that is what we ought to do. We do not want to trust to clothes and fires altogether, because that means we are not using the natural body furnace. We take refuge in these other mechanisms for keeping warm if we do not use our own body furnace. What does that mean? That means that our metabolism is reduced to a low level. * * * That means that we do not circulate our blood well, because exercise has the most colossal effect upon the circulation. The whole of my researches on the circulation go to show that the duty of the heart is to deliver the blood to the capillary vessels and it is the duty of the muscles to support the arteries and pump the blood back again into the heart, and if the muscles are not doing their work the circulation can not be efficient. When the muscles are at work the heart beats more quickly, and the blood is carried round the body much more quickly; each minute the whole blood volume is carried round the body many times.

Then when we are taking exercise we breath more deeply in order to get rid of the carbonic acid, and we take in more oxygen, the blood is more oxygenated, the lungs are better expanded, and this is the most important thing for resisting infection—the expansion and oxygenation of the blood takes place in every part of the lungs. Every part of the lungs is expanded if you take exercise. The ventilation of the lungs may be ten times as great as normal if you take extremely severe exercise—five or six times as much during ordinary hard exercise. That has a most colossal effect upon the lungs, expanding every part of them, and it has a colossal effect upon the circulation of the blood. And then, as we are using up energy in our muscles, we have to supply that energy, and that means we have to eat more, so that the appetite is excited: we eat more and absorb better. The food that we eat is all absorbed and utilized by the body; it does not go into the great bowel as a great deal of our food does when we are living sedentary lives. Rejected by the absorbing mechanism because the body does not want it, its fate is to become decomposed by bacteria and turned into feces and wind and toxic products of bacterial decomposition, which, if absorbed into the blood, may give us all of the symptoms of chronic poisoning, such as anemia and headache. That is all the fruit of sedentary work and living a sedentary life. If you are going to live a sedentary life and keep warm by means of clothes and fires you knock down your body furnace to such an extent that you want very little food, and the only way to live healthily and not degenerate our tissues by the products of bacterial decomposition thrown out of the large bowel is to live a very simple life and eat sparingly. If you live a sedentary life and eat large meals and drink alcohol you will get your body into such a condition that its

metabolism must go wrong after a certain number of years. Either excessive substances are going to be absorbed into the blood which are not wanted or you are going to be poisoned by toxic products derived from bacterial decomposition in the great bowel, and then the surgeon comes along and says the drainage system is out of order and he must short circuit it.

Exposure to wind and cold leads to increased activity on the part of the body and increased metabolism, and it is that which has an effect upon tuberculosis; it is that increased metabolism which is the end we have in view, to get more blood circulated, more oxygen breathed in, the lungs better expanded, more food eaten, and if we eat more food we are more likely to get those building stones which are found in food, some of which are exceedingly rare substances, like the vitamines, which are found in outer husks of wheat and rice berries, but are not found in white bread or polished rice. These are the kind of things which are absolutely necessary to the growth of the body—these vitamines. If we do not eat enough food to get sufficient of them, then the metabolism of the body suffers. Therefore it is wise to use our body mechanism so as to be able to eat enough food to get all the building stones required to nourish our frames and produce all the secretions of the body that are necessary for its metabolism.

The "Increase of tuberculosis in confined spaces" is amply demonstrated.

VENTILATION IN SHIPS.

In our battleships, of course, we have got exactly those conditions. The local government board insist that a pauper should have 1,000 cubic feet of space allotted to him in a dormitory. In our dreadnaughts 80 cubic feet is a space for each sailor, and in some cases even lower than 80. A battleship is not a brick building. In a brick building a great deal of ventilation takes place through the walls and windows and doors, even if it is shut up, but a battleship is a steel structure, and no ventilation of that kind can take place at all. Therefore it is absolutely necessary to have artificial ventilation. In these battleships they have air trunks which convey the air driven in by fans. The louvers open in the ceiling, but the men, when they feel the cold air blowing on them, can very easily put their hands out and shut them up. The British sailor does not like cold air, and he pushes out his hand and shuts the ventilator up near his hammock. I have seen the louvers sealed up with canvas and painted over in a super-dreadnaught. Here again the conditions which matter are the moisture and the heat of the air. In many places in these battleships you will find a wet-bulb temperature of from 80° to 90° F. To be under those conditions depresses the vitality of the body, and if there is a tuberculosis subject there the spray of his saliva will be carried from him to others. The saliva spray will not be cooled down, and the tubercle bacilli may preserve their vitality undiminished in the warm atmosphere. The right thing to do under all these conditions is to bring in fresh air through hose pipes, and have extraction fans working, and so on, in order to keep the air cool and moving in every possible way.

Recently Mr. James Keith, of Messrs. Keith, Blackman & Co., told me some facts about the *Lusitania*. In the *Lusitania* engine room, working at full steam, the temperature used to reach 150° F. It is distressing for the men to work in that temperature; it strains the heat-regulating mechanism of the body, and some of the energy which ought to go to external work is used to keep the temperature down. The blood is sent to the skin, and the heart has to exert its power in order to drive the blood to the skin and cool the body instead of send-

ing it to the muscles and viscera, where it is wanted. So the health of the men is depressed. Mr. Keith has put a big air trunk in, 5 or 6 feet in diameter, which goes straight down from the deck, and at the bottom of that trunk he has put a 5-foot fan which pulls in the outside air, not warmed in any way, and to such an extent that it pulls in 6,000,000 cubic feet of air an hour. The result of that is that the temperature is brought down from 150° to 70° F., and no draft is felt at all. So long as it is as warm as that no draft is felt, and the comfort to the men and the effects on their health, I am quite sure, will be extraordinarily good.

IDEAL CONDITIONS.

In all our rooms we want to have the air moving. I do not say to make an unpleasant draft, but to have the air gently moving. The ideal conditions are radiant heat, such as you get on a spring day when the sun is shining and there is frost in the air and a gentle breeze, with a warm sun. Those are the ideal conditions. In our rooms we want to get radiant heat. We never want to heat the air if we can help it. In heating a room let us heat it to the lowest degree compatible with comfort. Try to heat it by radiant heat and keep the air moving.

The Kata-Thermometer (made by J. Hicks, 8 Hatton Garden, E. C., London) or *Comfort Meter* * * * will prove to be of general utility. I have two large bulbed spirit thermometers. The bulb of one is covered with muslin. The stems are marked 110°, 100°, and 90° F. I warm the bulbs to 110° F. in warm water, then take them out and dry one and jerk the excess of water off the other. I let them cool and take the time occupied by the menisci in falling from 100° to 90° F. The wet bulb loses heat by evaporation and the dry by radiation and convection. On an ideal spring day the wet took 45 seconds and the dry 2 minutes 20 seconds. In a room with closed window and door and heated up to 70° F. by an anthracite stove they took about 1 minute 30 seconds and 5 minutes. Well, the conditions must be altered there, so that they fall in times approximating to those of the ideal spring day. The ventilating and heating should be arranged so that the instruments fall from 100° to 90° F. in about 45 seconds to 1 minute and 2 minutes 30 seconds to 3 minutes, and then comfort and healthy conditions will be obtained, particularly if the source of heat is a radiant one—an open fire or modern gas fire.—(C. N. F.)

ENGLAND, O. **My experiences relative to malarial prophylaxis on board a battleship.** Arch. f. Sch. u. Tr. Hyg., Bd. 17, Hft. 15, 1913.

The following is a summary of the author's views:

1. The anchorage should be at least 1½ to 2 sea miles from land.
2. Liberty should be restricted to sunset; entrance into native dwellings prohibited and such as are compelled to go ashore at night given 4 grains of quinine on return aboard.
3. Vegetables brought aboard should be thoroughly washed at the gangway.
4. Decked native boats should not be allowed alongside.
5. Close all hatches and ports on the side on which a coal or water barge comes along; sluice said side energetically with water when the barge has shoved off.

6. Destroy adult mosquitoes found aboard, and wash down bulkheads with soapsuds.

7. If the vessel lies closer than 1 mile to shore, screen all ports and hatches except the galley (screening renders heat here intolerable). Use iron wire, brass wire, or netting. The wire screening, if found too large meshed, as was the author's experience with the small African variety, can be heavily oiled, thus reducing size of apertures, as well as protecting metal from climate. The screens should be placed in position at 5.30 p. m., and removed at 6 a. m. Sleeping on the open decks should be forbidden.

8. Burn only the absolutely essential lights when lying near shore.

9. The deck watch at night should wear high shoes and be allowed to smoke.

10. Parties ashore should be given nettings, under which they must sleep at night.—(R. C. R.)

TROPICAL MEDICINE.

E. R. STITT, medical inspector, United States Navy.

WELLMAN, C., AND BASS, C. C. **Polyneuritis gallinarum caused by different foodstuffs.** Am. Jour. Tropical Diseases, August, 1913.

This very important series of experiments demonstrates conclusively that the idea that polished rice is exclusively connected with the production of polyneuritis in fowls is an error.

Consequently the tendency to legislate against polished rice in the United States by reason of its beriberi-producing properties is unreasonable because these experiments show that certain other articles of diet in common use and considered unobjectionable are even more productive of multiple neuritis than milled rice.

From their tables and accompanying illustrations of fowls it is seen that sago will produce polyneuritis in 20½ days, boiled potatoes in 24½ days, cornstarch in 32 days, milled rice in 33 days, wheat flour in 34 days, corn grits in 36½ days, cream of wheat in 39 days, and macaroni in 40½ days.

As a result of the evidence submitted by these experimenters the following resolution was unanimously adopted by the Society of Tropical Medicine:

"*Resolved*, This society deprecates legislation in this country (United States) against milled or polished rice as a food."—(E. R. S.)

Two cases of climatic bubo. Australian Institute of Tropical Medicine, report for the year 1911.

In 1896 Ruge reported cases of inguinal glandular swelling occurring among sailors on the Zanzibar coast which did not seem to be

caused by any of the factors ordinarily giving rise to such glandular enlargement.

As a rule the disease begins with slight fever and a hard swelling of the inguinal glands, usually of one side, rarely of both. The swelling is painful on pressure and sometimes increases to the size of a hen's egg. The swelling and pain may disappear in a few days or may go on to suppuration and fistula formation.

The etiology is unknown; a bacillus has been isolated which was practically identical with the *Bacillus pestis* and Cantlie regarded the disease as pestis minor, a mild form of plague, since he observed in China that several cases of climatic bubo preceded an outbreak of plague. Others have regarded the disease as a sequel of malaria.

Case 1. A laborer, 28 years of age; swelling in both groins appeared about three weeks before admission to the Townsville Hospital. In each groin were felt three glands, one the size of a hen's egg and two smaller; over the larger gland fluctuation could be detected. The temperature never went above 99.8° F. Examination and history revealed nothing to account for the swelling. The lymph glands were removed; the capsule was found to be thickened and the interstitial fibrous tissue increased; the superficial portions showed hemorhagic infiltration and in several irregular areas there was softening and suppuration. Microscopically, the connective tissue was increased. hemorrhagic infiltration was present throughout, and in some areas the lymph tissue was entirely replaced by leucocytes and there plasma cells were very conspicuous. The smaller glands showed normal conditions.

Inoculations of the pus were made on several sorts of media, but in no case did any growth occur.

Case 2. A stackman, aged 41; swelling in the right groin appeared about two weeks before admission. At the time of entering the hospital the largest gland was about 5 cm. in diameter and very painful on pressure; no fluctuation could be felt. The enlarged lymph glands were extirpated and the results on bacteriological and histological examination were similar to those in case 1.

The opinion is expressed that climatic bubo is a distinct disease and not related to plague and that the absence of plague bacilli in the juice obtained by puncturing the lymph gland easily verifies the diagnosis.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

A. B. CLIFFORD, passed assistant surgeon, and G. F. CLARK, passed assistant surgeon, United States Navy.

LEVADITI, C., AND BANKOWSKI, M. **Treponemata in the brain in general paresis.** Annales de L'Institut Pasteur, 25 July, 1913.

The authors note that the results of examination by the old Levaditi methods are inconstant. They refer to the work of Noguchi

and Moore and state that they have confirmed the work and have collected certain new facts.

According to Levaditi and Bankowski the proliferation of the treponemata in the cerebral cortex proceeds by successive outbreaks. These foci are most frequent in the anterior lobes. There is a striking similarity between the periodical manifestations in the brain and those of the skin and mucous membranes. These accessions leave a sclerosis similar to the induration following a chancre. A focus becomes free of parasites after developing the sclerotic changes, which macroscopic changes are not manifest in the areas newly invaded and which may abound in treponemata. They think that the apoplectiform attacks of general paresis are due to proliferation of spirochaetes in the motor areas and that if a patient should die in such an attack the best chance of finding the organisms would be had.

As regards technique, they employed dark field illumination, Burris's india ink method, and Löffler's method for flagella. Another method used by these workers, which is not so commonly understood as the above, was the Fontana-Tribondeau method. In this a drop of cerebral emulsion is spread upon a slide. This is fixed for one minute in an aqueous solution containing 1 per cent of acetic acid and 2 per cent of formalin. The preparation is then washed in water. It is then mordanted by steaming for 30 seconds with the following mordant:

Carbolic acid	1 c. c.
Tannin	5 gm.
Distilled water	100 c. c.

Again wash in water. Finally steam the smear for 30 seconds with the following solution: Dissolve 0.25 gm. of silver nitrate in 100 c. c. water. Then add ammonia drop by drop until the precipitate which forms is just dissolved. Wash, dry, and examine. The spirochaetes are stained a dark brown upon a yellow background. The nerve fibrils are colored yellow and have large and irregular undulations.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

CRAIG, C. F., M. C., U. S. A. **The identity of entameba histolytica and entameba tetragena, with observations upon the morphology and life cycle of entameba histolytica.** Journal of Infectious Diseases, July, 1913.

The author notes that Walker was the first to recognize that the nuclear structure of *E. histolytica* varies under different conditions—at times presenting the typical histolytica type of nucleus, while at other times showing the tetragena nucleus.

Craig thus compares the two types of nucleus: That of the histolytica type has a well-stained nuclear membrane, which is very

thin and has a few minute chromatic granules upon its inner side. It has a very small karyosome, often appearing as a minute dot of chromatin at or near the center. There is no centriole. A few dots of chromatin may be seen between the membrane and the karyosome. The entire nucleus appears delicate. In the tetragena type the nuclear membrane is much thicker and there is a comparatively large karyosome situated at or near the center of the nucleus and containing a well-marked centriole. The centriole often appears as a deeply stained dot of chromatin surrounded by a well-marked, unstained halo.

The histolytica type is most frequently found in patients presenting the most severe symptoms of dysentery, when multiplication by simple division is rapid. This type of nucleus is not degenerative, as claimed by Hartmann. The tetragena type of nucleus is most often met with in cases presenting but slight dysenteric symptoms.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

HOWLETT, F. M. **The breeding places of phlebotomus.** Jour. Trop. Medicine and Hygiene, Aug. 15, 1913.

The author states that the necessary conditions for breeding are:

1. A moderate degree of moisture.
2. Protection from light.
3. The presence of nitrogenous refuse; particularly the débris of dead insects, decayed fungi, and perhaps the excreta of insects. An excess of nitrogenous matter is unsuitable. No larvæ have been found in latrines.
4. The presence of brick, stones, tiles, or cement is associated with breeding places, probably connected with the condensed moisture, coolness, and protection from light. The larvæ have generally been found in damp places, as cellars and caves.

It is noted that there is a frequent association between sand flies and wall lizards. The flies bite these lizards. Again, there is a suggestion that the nests of ants may afford suitable breeding places.—(E. R. STITT, MEDICAL INSPECTOR, U. S. NAVY.)

DREW, G. HAROLD. **An experimental investigation of the cytological changes produced in epithelial cells by long-continued irritation.** Journal of Pathology and Bacteriology, July, 1912.

The object of these experiments was to make a cytological study of the changes produced in epithelial cells by long-continued and repeated stimulation, and also to investigate any alterations in the

mutual relationship of these epithelial cells and the neighboring tissues which might be produced by such continued stimulation.

Two hundred specimens of fish, *Fundulus heteroclitus*, were selected as near as possible of the same size and age. These were all kept in the same tank under identical conditions, and very few were lost from disease or accidental injury.

The scales and epidermis over a small area on each were scraped away and the epidermis allowed to regenerate for three days. In this way a smooth surface of regenerated epithelium was obtained having a definite single row of basal cells in contact with the dermis and layers of more or less degenerated superficial cells. There was no tendency for any regeneration of the scales to take place.

The regenerated surface was painted with a solution of iodine (acting as an irritant) at 10-day intervals, up to a maximum of 60 days, which was the limit of the experiment.

After the forty-fifth day of this treatment multipolar and other irregular types of mitosis were observed, and these were more common in specimens examined on the sixtieth day than at an earlier date.

Of 150 fish examined between the forty-fifth and sixtieth days 146 showed little deviation from the condition produced by simple regeneration without irritation, except that a trifling amount of inflammation of the subepidermal tissues was caused and irregular mitoses were present. Of the remaining 4 cases 1 showed considerable outgrowth of fibrous tissue and epithelium, with an arrangement somewhat suggestive of a papilloma, 2 showed a slight ingrowth of the epithelium with the formation of small islands of epithelial cells surrounded by fibrous tissue, and 1 showed a much more advanced ingrowth of the epithelium, with the formation of processes and islands of epithelial cells extending as far as the muscles, the condition resembling that found in a very early stage of epithelioma.

Since all the experiments were performed in exactly the same way and under precisely the same conditions, and control experiments were made to eliminate the possibility of the abnormal epithelial growths obtained in four cases, being due to accidental differences in the intensity of the irritative process, it appears that the same amount of irritation of the epithelium does not necessarily produce the same results in all individuals of the same age, size, and species. It can thus be concluded, at least in the case of *Fundulus heteroclitus*, that differences exist in the power possessed by the individual of regulating the growth of its epithelial cells under the influence of continued irritation, but that these individual idiosyncrasies are present in only a very small percentage of cases.—(A. B. C.)

WEDD, B. H., and RUSS, S. **The effect of Röntgen and radium radiations upon the vitality of the cells of mouse carcinoma.** The Jour. of Pathology and Bacteriology, July, 1912.

It has been shown by several observers that an undoubted effect is produced upon mouse tumors *in vivo* by the action of X-rays and radium radiation.

In experiments performed upon tumor tissue *in vivo* it is difficult to exclude the effects produced by the reaction of the tissues of the animal. To exclude this factor the authors used tumor tissue freshly excised under aseptic conditions, which tissue subsequent to irradiation was transplanted into mice and its power of proliferation compared with control portions of the same tumor.

The tumor used was an adeno-carcinoma of the mamma of the mouse, which gives a high percentage of successful results in inoculation and forms large tumors before degeneration is advanced.

Initial experiments were made by exposing excised tumors for three hours to composite X-rays. On three separate occasions such tumors showed no sign of proliferation when transplanted. A series of observations was then made by varying the time of exposure between five minutes and two hours.

An exposure of half an hour has an appreciable inhibitory effect upon the proliferating power of the tumor. No growth of the tumor has been observed subsequent to irradiation lasting two hours by unscreened X-rays of a moderately soft type.

Out of the 70 controls which survived, 67 per cent developed tumors.

Up to the fourth day there is no striking difference between the irradiated and control grafts.

On the sixth day the control tumor is seen to be undergoing rapid proliferation, and the graft, though still small, has the appearance of the original tumor in miniature. The appearance of the irradiated graft still resembles that of the control, but the cells of the parenchyma are more irregular in shape and there is more fibrous tissue present. Karyokinetic figures may be seen in both sections.

Eight days after inoculation the control tumor is the size of a hempseed and karyokinetic figures are numerous. The irradiated graft consists almost entirely of fibrous tissue.

It seems justifiable to conclude from these observations that the cells of the irradiated graft were not actually killed before inoculation, as they appeared to persist for several days and even to undergo proliferation.

The authors conclude:

1. Freshly excised mouse tumors, when sufficiently irradiated by X-rays and subsequently inoculated into other mice, do not proliferate.

2. The inhibitory effect is more marked when the irradiation is brought about by means of soft, i. e., easily absorbed X-rays than when a very penetrating type is used.

3. Excised tumors irradiated for about one hour by the β rays from 5.6 mgrms. of radium bromide do not proliferate on transplantation. An exposure of 18 hours to the γ rays from the same quantity of radium is insufficient for an appreciable inhibitory action.

4. Histological examination of irradiated grafts at intervals after inoculation shows that the cells of the parenchyma of the tumor persist for several days, but are eventually replaced by fibrous tissue.—(A. B. C.)

PILCHER, J. T. **A contribution to the etiology of pernicious anemia.** Amer. Jour. Med. Sci., August, 1913.

The author reviews the work done on the pathology of the stomach associated with pernicious anemia. Herzberg and Faber believe that the gastric and blood phenomena in pernicious anemia arise from the same cause. The author makes his observations in the hope of throwing some light on this etiological factor.

In the analysis of 433 cases of abdominal complaint presenting the symptoms of achlorhydria hemorrhagica gastrica, 34 cases of pernicious anemia were found. Of the 433 cases of achlorhydria examined, 149 were operated on for definite intra-abdominal disease. The findings showed involvement of the appendix in 52, the gall bladder in 57, the gall bladder and pancreas in 21, and the stomach in 19 cases. In 156 of the remaining cases the onset of gastric symptoms seemed to bear an immediate and direct relation to various diseases and conditions, among which the incidence of infectious diseases in 38 cases, circulatory disturbances in 12, postoperative development in 14, and derangement of the ductless glands in 2 instances, deserve mention.

In view of the extraordinary degree of gastric disturbance which irritation of distant organs can produce, it is a fair conclusion that reflex nervous phenomena are responsible for the inhibition of the production of hydrochloric acid in these cases.

The bacterial flora present in cases of achlorhydria hemorrhagica achylia gastrica and pernicious anemia are identical. Streptococci, colon, diplococci, lactic acid, staphylococci, proteus, and leptothrix are present in great numbers. A chemical analysis can be foretold almost without exception from the picture of the bacterial flora under the microscope. The author then notes the work of McCaskey, who has obtained streptococci from blood cultures in all cases of pernicious anemia with fever which were examined.

Many of the phenomena of the disease speak strongly in favor of an infective agency.

The following facts are then presented:

1. Achlorhydria is merely a symptom denoting a marked degree of chronic gastritis.

2. It is usually evoked through extra-gastric irritative factors which are in many cases capable of correction.

3. There are, without exception, present in such stomachs great numbers of bacteria ordinarily considered pathogenic, among which streptococci are especially to be noted.

4. Practically all recorded cases of authenticated pernicious anemia present the symptoms of achlorhydria, and in my own series of 34 cases the presence of occult blood in the stomach extract.

5. Thirty-four instances of pernicious anemia were noted in patients presenting the symptoms of achlorhydria hemorrhagica gastrica.

6. In a few of these cases the lack of hydrochloric acid and the presence of occult blood were known to exist at least one year before any blood changes were to be noted. In others the phenomena of paresthesia were evidenced some time previous to blood impairment, and many had suffered for years from chronic gastrointestinal complaints.

7. Eighty per cent of cases of pernicious anemia have increased temperature some time during the course of the disease.

8. Pure cultures of streptococci have been found by competent observers in the blood of patients with pernicious anemia who were running a fever.

9. Bacterial hemolysins are known to produce anemia resembling the pernicious type, as are other toxic substances, among which may be classed the lipoid group.

10. Efforts directed to the control of bacterial growth in the body, and particularly in the gastrointestinal tract, have caused complete remissions in this disease in some instances.

11. The phenomena of occurrence, remission, and reoccurrence of the blood picture characteristic of pernicious anemia may be explained by our present knowledge of the action of toxins, of whatever source, impairing the formation of antibodies until a bacteremia is produced which may be clinically recognized.

12. The toxins are present, being eliminated by the profuse flora in the gastrointestinal tract; the impairment of bodily resistance is accomplished through their absorption and the disturbance of digestion in cases of achlorhydria.

13. Finally, reactive and combative ability of patients suffering with achlorhydria varies in different patients, and on this ground alone might be explained the relatively rare occurrence of pernicious anemia, although the occurrence of achlorhydria is fairly common. Thus the development of pernicious anemia would seem to be dependent upon a personal idiosyncrasy of certain individuals: in fact we must revert for the real etiological factor of its inception to an embryonic tendency, the presence of which we are not as yet able to determine until it has been stimulated into an active destructive agent of the blood by the toxins absorbed from the profuse bacterial flora present in the stomach.—(A. B. C.)

ORDWAY, T., AND KELLERT, E. **The complement content of the blood in malignant disease.** Jour. Med. Research, July, 1913.

The authors review the literature of the subject. From titration of the serum of 11 normal individuals they found that the complement was relatively constant, and from one-tenth to one-twentieth of the titre of pooled guinea-pig serum.

Of 12 sera from individuals suffering from leukemia, sprue, sarcoma, cardio renal, and Hodgkin's disease, three failed to show hemolysis in doses four times the amount of that found satisfactory with serum of normal individuals. There was no increase in complement in leukemia, despite the large number of leucocytes.

Of 30 sera from cases of carcinoma 27 showed normal complement content.

They conclude that the complement content, in cases of carcinoma, is practically the same as in health.

While this work is not based on a large series of cases, it should be of interest to those who are using the Emery technique for the Wassermann reaction.—(G. F. C.)

CHEMISTRY AND PHARMACY.

E. W. BROWN, passed assistant surgeon, and O. G. RUGE, chief pharmacist, United States Navy.

KNOOP, F. **Some modern problems in nutrition.** Bulletin of Johns Hopkins Hospital, June, 1913, p. 171.

If the results of some recent investigations of biological chemists are accepted as true, our conceptions regarding the functions of food substances in the body must admit some very essential alterations. Since, in the animal organism, the food substances are not utilized as is fuel in an engine and, since the food units have actually to furnish new material for the repair of the ever-changing parts of the machinery consuming them, the constant regeneration of these parts constitutes an important part of their chemical functions; therefore, any new light thrown on the latter must be regarded as a fundamentally important step ahead.

Metabolic physiology, in the old sense, knew but little of the detailed chemical structures of food substances and the changes they underwent within the organism. It stood, like a gatekeeper in front of a chemical factory, keeping an account of what went in and of what came out, but of what was going on inside, it knew of nothing to tell us.

Nor has the study of morphology, in spite of having at its disposal highly developed optical methods, given us a much deeper insight into the various types of vital processes. The relations between the different parts of the body are, apparently, not exclusively controlled by visible morphological factors. The names of adrenalin and secretin, pituitrin and iodothyrin suggest a series of organs about which anatomical investigations have taught us almost nothing, but about whose chemical functions we are at least partially informed. The hormones which regulate the vital activities of the whole body are produced by the organism itself and the chemistry of the forma-

tion of these bodies must be altogether distinct from that of the normal breakdown of food material furnishing the energy of the organism. For a long time the attempts at finding intermediate products which would directly indicate the paths of normal metabolism were unsuccessful. This very remarkable fact may perhaps be explained on the assumption that only a few molecules of a substance undergo oxidation at one time and that their catabolism is completed before new molecules are attacked. Thus, but few molecules will be found in the first, second, or third stage of oxidation, so that the concentration of intermediate products of catabolism must always be low.

Up to most recent times only hydrolytic changes, such as the breaking up of CO and NC groups with addition of water had been observed. This type of change is seen in the conversion of protein into amino-acids with intermediate formation of albumoses and peptones, or in sugar production from starch, or fatty acids and glycerine from fats. But none of these reactions that are effected by digestive ferments involve oxidation and they liberate no significant amount of energy and bring about no alteration in the chains of carbon atoms.

The type of change involving oxidation was first encountered and recognized with fatty acids. Through the introduction into the fatty acid molecule of phenyl, which makes it resistant to attack in the body, it became possible to show that fatty acids underwent oxidation in such a way that the oxygen invariably attaches itself to the β-carbon atom and the ketonic acid thus formed yields, on further oxidation, a saturated fatty acid containing two less carbon atoms. This has led to an intelligible comprehension of the origin of the acetone bodies from fatty acids in the diabetic organism. Until Dakin produced this same change in the laboratory by hydrogen peroxide, the reaction had never been known to chemists.

Attempts were now made to gain an insight into the mechanism of the breakdown of the amino-acids derived from protein by employing essentially the same general methods; that is to say, by the use of a phenyl substituted homologues. All the amino-acids contain their nitrogen similarly linked to the α-carbon atom. This nitrogen may be split off in the form of ammonia, leaving an α-ketonic acid containing the radicle, CO-COOH. Thus the amino-acids are converted into fatty acids and their nitrogen-free radicles from protein behave like fatty acids in their subsequent transformations. In this manner many valuable details were discovered. Fat formation from sugar was explained and it is furthermore rendered pretty certain that acetoacetic acid is the primary product from which β-hydroxybutyric acid is formed by secondary reduction; we also know now that protein may yield carbohydrate.

But the possibility of the reverse change, namely, the formation of protein from sugar and ammonia, was apparently not thought

possible. The capability for synthesizing protein-Bausteine from inorganic nitrogen was reserved solely for plants, and amino-acids seemed to be looked upon as the simplest substances capable of meeting the nitrogen requirements of animals. Experiments have since demonstrated that the animal body can synthesize amino-acids from ammonia and ketonic acids, into which they may be reconverted later. This catabolic reaction is evidently reversible. We will have, therefore, to abandon the conception of differences between plant and animal chemistry based upon the supposed inability of the animal body to effect synthesis. Ammonia is constantly present in small quantities in the animal body and α-ketonic acids which may react with it to give amino-acids, originate, as we now know, not from fatty acids but from sugar. We know relatively little of the oxidative catabolism of sugar, but we do know that in one way or another lactic acid and peruvic acids may be formed and that both these acids may be combined with ammonia to form protein-Bausteine, especially alanin. We now understand the protein-sparing action of carbohydrates, while the fatty acids, yielding β-ketonic acids, not convertible into protein-Bausteine, have not the same action. Fact and theory agree.

Investigations by both clinicians and physiologists have shown, according to Prof. Knoop, that animals may be maintained almost in nitrogen equilibrium, for weeks at a time, with ammonia as their sole source of nitrogen, and it would seem, therefore, as if the consumption of protein material of the cells might be reduced almost to nothing, providing an excess of carbohydrates is administered. This revolution in our conceptions of metabolism we owe to an exact study of a single chemical reaction, shown in the following equation:

$$-CO-COOH+NH_3 \rightleftarrows CHNH_2 \cdot COOH+O$$

—(H. G. BEYER, MEDICAL DIRECTOR, UNITED STATES NAVY, RETIRED.)

RUTTAN, R. F., AND HARDISTRY, R. H. M. **New reagent for detecting blood.** Canadian Med. Assoc. Jour., Nov., 1912.

A 4 per cent solution of toluidine in glacial acetic acid is recommended for the detection of small quantities of blood. One c. c. of the liquid to be tested for blood is treated with 1 c. c. of 3 per cent hydrogen peroxide and 1 c. c. of the reagent; if blood is present a green to bluish-black coloration develops gradually and persists for several hours. The reagent was found to be capable of detecting 1 part of blood in 7,000,000 parts of aqueous solution, 1 in 24,000 parts of urine, 1 in 100,000 parts of feces, or 1 in 30,000 parts of stomach contents: it is more sensitive than the similar benzidine reagent.—(E. W. B.)

MARSHALL, E. K. **A rapid clinical method for the estimation of urea in urine.** Jour. Biol. Chem., 1913, 14, 283–290.

The urine is treated with extract of soy bean; the extract contains a ferment, urease, which rapidly converts urea into ammonium carbonate. The urea originally present is calculated from the ammonia produced. Five c. c. of urine are measured into each of 2 flasks and diluted to 100–125 c. c. with distilled water; 2 c. c. of the ferment solution are added to one, a few drops of thymol solution to both and the two mixtures are kept at room temperature over night. Titration is then carried out with N/10 HCl and methyl orange as the indicator. The alkalinity of the mixture of urine and ferment solution, less that of the urine and that previously estimated for the ferment solution, corresponds to the ammonia formed from urea. Albumin and glucose do not interfere. The error is only ± 2 per cent.—(E. W. B.)

DENIGÈS, G. **Preservation of milk samples for analysis.** Ann. Chim. Anal. Appl., 1913, 18, 189–192.

A solution of 50 gms. of phenol in 10 c. c. of 95 per cent alcohol has proved more satisfactory than any of the other antiseptic agents used for the preservation of milk samples. The addition of 1 c. c. of this solution to 100 c. c. of milk keeps the sample indefinitely, and does not affect the estimation of the acidity, lactose, fat, casein, ash, or extract. A sample of milk thus preserved gave exactly the same analysis after 10 years as at first.—(E. W. B.)

HEAD, J. **Dentifrices and their ingredients.** Jour. A. Ph. A. and Merck's Market Report, May, 1913.

This paper is a discussion and summary of a series of experiments made with a tooth brush on natural teeth, brushed for ten minutes with various dentifrices, mouth washes, powders, etc., to determine their effect upon the enamel and cementum of the teeth. With few exceptions the tests showed a loss of enamel or cementum, or both, varying in degree from 1/10,000 to 126/10,000 of an inch. The loss is greatest with powders containing grits, proving that tooth powders containing grit are harmful and should not be used for cleansing the teeth. The only substances that showed no erosive effects were sodium perborate, very fine magnesium peroxide, and a saturated solution of sodium silicofluoride.

Solium perborate and magnesium peroxide are bland salts forming alkaline peroxide solutions and make valuable antiseptic powders.

A saturated solution of sodium silicofluoride is highly recommended as an antiseptic for use in the treatment of pyorrhea; its healing effect on inflamed gums, the author states, is so satisfactory as to be little less than marvelous. The peroxide and fluoride antiseptics destroy bacteria chemically, but do not destroy the enzymes and ferments either of the mouth or of the stomach, in fact they seem to have a selective tendency for pathogenic germs, which make them very useful as mouth antiseptics.

The author believes the use of peroxide forming dentifrices should be encouraged, but experiments made with those at present on the market prove that they do not deliver the desired amount of peroxide solution to make them effective. The following formula is recommended for general use by the author for persons with healthy gums:

	Parts.
Magnesium peroxide (No. 200-inch sieve)	60
Sodium perborate	30
Powdered soap	10
Flavoring to suit.	

—(O. G. R.)

EYE, EAR, NOSE, AND THROAT.

G. B. TRIBLE, passed assistant surgeon, United States Navy.

PHILLIPS, W. C. **Treatment of persistent otorrhea in infants and young children by the establishment of postauricular drainage.** Laryngoscope. Vol. XXIII. p. 779.

By persistent otorrhea is meant that form of infection consequent to the exanthemata, grip, or pneumonia. This condition is to be differentiated from the recurrent otorrhea, dependent upon attacks of rhinitis in children of the adenoid type.

In many cases there is an underlying dyscrasia, often tuberculosis or syphilis, which makes the condition very stubborn.

After faithful local treatment free drainage by paracentesis, attention to the general health, and the removal of adenoids and hypertrophied tonsils, if such exist, the author advises through and through drainage by means of the simple mastoid operation. Only in the more chronic ones has the simple mastoid been insufficient, and the radical becomes necessary.

The following reasons are given: (1) It quickly terminates an otherwise persistant otorrhea; (2) it insures against an extension of local bone necrosis; (3) it prevents the case from becoming a chronic purulent otitis media, with bone necrosis and possible serious and fatal complications: (4) there is, after operation, restoration and retention of the hearing function.—(G. B. T.)

VERHOEFF, F. H. **Parinaud's conjunctivitis; a mycotic disease due to a hitherto undescribed filamentous organism.** Archives of Ophthalmology, Vol. XLII. No. 4.

Parinaud in 1889 described that form of conjunctival disease characterized by peculiar granulations springing usually from one of the retrotarsal folds, and associated with enlargement of the pre-auricular lymphatic gland.

Various theories relating to the causation of this condition have been advanced, but the histological examination of 12 cases has shown the existence of a peculiar minute filamentous micro-organism. This organism was found interlaced in the necrotic areas, and is classified, in the absence of a further study, as a leptothrix. This was present in 11 of the 12 cases, all of which were histologically and clinically Parinaud's conjunctivitis.—(G. B. T.)

SZILY, A. v. **The significance of anaphylaxis in eye work. (Ueber die Bedeutung der Anaphylaxie in der Augenheilkunde.)** Klin. Monatsbl. f. Augenheilk., Feb., 1913.

According to Elschnig's theory, an injury to one eye liberates uveal pigment, which by absorption sensitizes the organism to this antigen. Then with the occurrence of an injury to the other eye or any slight affection associated with a disturbance of the pigment, there occurs a local anaphylactic inflammation. This explanation has been offered of sympathetic ophthalmia, and from the author's experiments on the eyes of rabbits, can be utilized in the explanation of certain cases of interstitial keratitis.

It is still a question, however, whether sensitization to homologous tissue products can occur.—(G. B. T.)

O'MALLEY, J. F. **The difficulties of tonsillectomy and how to deal with them.** Lancet, Vol. 2, 1913, p. 19.

The author describes a method with a tonsillotome of his own construction, which to the reviewer resembles very much the Sluder method, though the author claims the only points of similarity are the use of the reverse side of the tonsillotome and the use of the finger for pushing the tonsil through the ring.

The tonsillotome is inserted through the mouth with the outer aspect toward the tonsil, using its lower edge as a tongue depresser. It is threaded on the tonsil, the latter being raised upward and outward, until it bulges against the anterior pillar. The tonsillotome lies horizontally across the mouth. The instrument is partially withdrawn so as to free it from all bony points, and the finger or

thumb of the other hand is used for pushing the tonsil through the ring.

The blade is inserted and the finger withdrawn, rotation toward the uvula is then made to sever the thin film of tissue remaining between the blade and the ring of the instrument.

The following difficulties are mentioned: (1) The left tonsil; (2) the very large tonsil; (3) the immobile tonsil, one bound down by fibrous inflammatory bands; (4) the small flat friable tonsil; (5) the pulpy tonsil; (6) removal of the uvula (not of any great importance.—G. B. T.); (7) buttonholing the soft palate; (8) removal of portions of the anterior pillar; (9) tearing the posterior pillar; (10) removal of portion of the pharyngeal aponeurosis; (11) tearing the mucous membrane over the point where the soft palate lies in relation to the hamular process of the internal pterygoid plate; (12) hemorrhage.

Recently the reviewer had occasion to witness the performance of about 12 tonsillectomies by Dr. Sluder's assistant and coworker, Dr. Gundlach, and so far as could be made out the practical application of the methods are nearly identical. So far as removal of a portion of the pillar is concerned, it was always removed, but only to the depth of the mucous membrane. Repeated microscopical examinations under Dr. Sluder's direction failed to reveal any muscular tissue. The anesthetic used in children was nitrous oxide gas with oxygen. Rather severe but extremely transitory bleeding took place, usually ceasing immediately after the patient recovered from the congestion due to the gas.—(G. B. T.)

PEEL, T. A. **Notes on the vaccine treatment of infections which involve the cornea.** Ophthalmoscope, Vol. XI, p. 471.

The following cases were treated by vaccine administered by hypodermic injection into the forearm.

Cases 1, 2, and 3. Phlyctenular conjunctivitis, after resisting local treatment for considerable time, 3 to 7 weeks, responded to tuberculin.

Cases 5 and 6. Keratitis. In case 5, local treatment for 3 years, no improvement; tuberculin 6 weeks, improved. In case 6, general treatment for 3 months, slight improvement; tuberculin 1 week, marked improvement.

Case 7. Keratitis and iritis. General treatment 6 weeks; tuberculin 4 weeks, cure.

Case 8. Gonorrheal ophthalmia. General treatment 6 weeks, slight improvement; vaccine 2 weeks, cure.

Case 9. Chronic pneumococcal conjunctivitis. Local treatment 3 weeks, no improvement; tuberculin 5 weeks, no improvement; vaccine 2 weeks, cure.

In the author's opinion vaccine therapy is suitable in localized infections, such as infections of the eye, and is practicable in out-patient practice.—(G. B. T.)

FRAZIER, C. H. **Intercranial division of the auditory nerve for persistent tinnitus.** Jour. Amer. Med. Assoc., Vol. LXI, p. 327.

This operation was first suggested by Dr. Charles K. Mills for the relief of aural vertigo.

The indications are persistent and intractable tinnitus in which there is no central involvement. There may be associated vertigo or otalgia. The cases in which the disease is labyrinthine in origin, in either the cochlear or vestibular ganglion, or both, offer the best prospect of good result. Hearing in these cases is of little import, for there is already deafness on the affected side. Operation in the case reported was performed on that portion of the occipital bone between the emissary sinus and the median line, left side, below the superior curved line, and from the level of the lateral sinus downward for 3 cm., removing the bone with rongeur forceps. The dural flap was reflected, introducing a brain retractor beneath the cerebellar hemisphere and elevating to allow the escape of the cerebrospinal fluid from the cisterna magna. The dural sac was punctured to allow withdrawal of the cerebrospinal fluid and greater displacement of the hemisphere. The hemisphere was gently displaced backward and the petrous bone gradually uncovered as far as the internal auditory meatus. The auditory and facial nerves were identified, the auditory separated from the facial and divided. An electrode applied to the facial nerve elicited an immediate response. The result of the operation was extremely gratifying, the roaring having ceased.—(G. B. T.)

MISCELLANEOUS.

UTHEMANN, DR., MARINE-GENERALARZT. **The sanitary service in the Japanese Navy during the Russo-Japanese War.** Veröffentl. a. d. Gebiete des Marine-Sanitätswesens. Medizinal-Abt. des Reichs-Marine-Amts, Heft 5. Berlin, 1913, Mittler u. Sohn.

The sanitary report of the Japanese Navy on the Russo-Japanese War was completed and published in 1911. Since that time three different translations have appeared, namely: (1) An abbreviated translation into English by the Japanese themselves; (2) a partial translation into French by Dr. Chemin of the French Navy; and (3) the translation into German, now before us, by Marine-Generalarzt Dr. Uthemann.

Since Dr. Uthemann, himself a very close student of the subject, and for several years on duty in the Far East, has enjoyed the

additional advantage of utilizing a previous French, as well as an English, translation in his present work, it may be presumed that his translation is, perhaps, the most comprehensive one.

No mere review of so important a work could possibly do justice to it. The facts recorded will require intensive personal study by the naval expert, careful weighing and sifting of the evidence under a given set of conditions, and critical, unbiased inductive reasoning before their true significance can become clear and of practical value to the student. This review must be limited to a few general impressions recorded by our author in the preface to his paper.

According to Uthemann the Russo-Japanese War, like the Spanish-American War, lacks the characteristics of a "pure experiment." Nevertheless, from some of the facts recorded in the report, we may derive accurate estimates as regards either the correctness or the erroneousness of some of our preparations for war. This is of considerable value. Valuable, also, are considered to be the published personal expressions of opinions of the different medical officers. Uthemann himself intentionally omits a discussion of the character of the report as a whole, in order to avoid interfering in any way with the freedom of the individual judgment of the reader.

In many respects the unexpected occurred. Thus, for instance, the attempted asepsis was not uniformly carried out everywhere. On board most of the ships asepsis was combined with antisepsis. Naturally, every surgeon under such conditions again using his own judgment, no uniformity as regards wound treatment was observed. This lack of uniformity of wound treatment made it impossible to judge correctly the influence of any treatment on the healing of wounds. The Japanese fleet surgeon himself remarks that only a few wounds had healed after primary union, that antiseptic treatment failed to prevent infection, and that wounds thus treated were in a worse condition when brought to the hospital than were those not so treated.

The Japanese adopted the method of primary sutures for approximating the edges of large wounds. A large number of such wounds suppurated, pus collecting in pockets. It would seem, therefore, better to approximate the edges of such wounds by bandages rather than sutures. It was noted that surface wounds not treated, even in cases in which the wounded had been spending several hours overboard floating in sea water, healed just as well as those covered with bandages.

With regard to the distribution of the dead and wounded, it was found that the personnel of the signal corps suffered the greatest losses, while that of the engine-room force had the smallest. There

were, however, relatively more deaths among the latter. (Burns and scalds, sinking of ships.)

Uthemann speaks of it as rather singular that the report mentions but one casualty during which cases of gas poisoning were observed. This was when the *Chiyoda* ran against a mine before Port Arthur. The report on this accident simply states that the men in the steerage while attempting to stop the leak were poisoned by carbon monoxid gas.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

Sanitätsbericht über die Kaiserlich Deutsche Marine für den Zeitraum v. 1 Oct., 1910 bis 30 Sept., 1911, bearbeitet in der Medizinal-Abteilung des Reichs-Marine-Amts. Berlin, 1913, Mittler und Sohn, Kögl. Hofbuchhandlung. Kochstr. 68–71.

The present report gives a very condensed account of the more important sanitary, medical, and surgical activities of the Bureau of Medicine and Surgery of the Imperial German Navy Department, compressed into 236 pages. Such a report would serve as excellent material for expansion; it will not admit of further condensation, and there is not one single misprint in the book.

The report represents a splendid record of one year's work, well done, by one of the most thoroughly organized bureaus of the department of a great navy.

The subject matter of the report is treated of under three great divisions.

The first division deals with (A) the admissions and the discharges of the sick and their numerical relations to the strength of the service; (B) the losses incurred by disability from various causes, their final disposition; (C) the losses to the service due to mortality from diseases and accidents; (D) the more important sanitary measures introduced during the year into ships and stations, summed up very briefly by Marine-Oberstabsarzt Dr. Benson.

The total admission rate for the year 1910–11 is recorded as 575.1 per thousand. The total number of discharges for unfitness for the service and disability with pension amounted to 53 per thousand. The very condensed report by Dr. Benson of the various sanitary measures introduced during the year in ships at home and abroad, as well as in home and foreign stations (Kiantschou, Pekin, and Tientsin), according to prevailing requirements, speaks volumes for the close attention to hygienic details by the sanitary officers of the German navy and their uniform system of training which they all must receive in order to enable them to meet so many different and ever-varying requirements, when and wherever they may arise, with such practical and so uniformly successful results.

The second division of the report treats of the more important cases of diseases observed during the year, describing the most con-

spicuous ones and reviewing the larger operations performed. The charts show that the most prevalent diseases were those of the digestive organs; then follow those including the mechanical injuries, diseases of the skin and cellular tissues, then those of the sexual organs, which latter show a greater numerical prevalence on foreign than on home stations.

Those interested in tropical diseases will find abundant food for profitable thought in the report by Marine-Stabsarzt Dr. Weissenborn, especially under the head of malaria. This disease showed a slightly increased admission rate during the period covered by the report over the year immediately preceding it of 2.13 per thousand, due to new and not to recurring cases. The tertian type occurred on all the stations; it appeared exclusively on the American and Mediterranean Stations, while, on the East Asiatic Station, out of 23 admissions, 22 were of the tertian and 1 only of the tropical type. Blood examinations were made in all cases, some medical officers employing, right from the start, the "thick-drop method" of Ross-Ruge, by means of which parasites were found in 100 per cent of the cases.

Quinine prophylaxis, with little interruption, was adhered to on all malarial stations. The diseases of the nervous system are described by Dr. Auer; those of the heart, lungs, etc., by Dr. Weber; the genito-urinary and sexual diseases by Dr. Rost; the diseases and injuries of the eyes by Dr. Schönherr; the diseases of the ear, nose, and throat by Dr. Nerger; surgical diseases, by Dr. Amelung and Dr. Mohr.

In the naval hospital at Yokohama 94 persons, with 1,163 sick days, of which 43 men with 735 sick days came from cruising ships, were treated during the year.

The third and concluding division of the report gives a statistical review of (A) the movements of the sick on shore and aboard the different ships and stations, and (B) the different diseases as found distributed on single ships and stations.

In addition, there is found a table in the report that attracted the attention of the reviewer. This table shows that during the year of 1910–11, 52 enlisted men had been sent to some of the most noted sanitaria for treatment, such as Wiesbaden, Apenrade, Klein-Machnow, Nauheim, Neuenahr, Sulzhayn, San Remo, etc. In view of the great reputation of most of these resorts, one can hardly escape a very profound impression of the existence of an intensely humane motive, an unqualifiedly, highly benevolent desire toward the enlisted men of the service on the part of a Government that sends 52 of its enlisted men for treatment to sanitaria generally believed to be reserved exclusively for the very richest and most fashionable portions of the community.—(H. G. BEYER, MEDICAL DIRECTOR, U. S. NAVY, RETIRED.)

Since the Montalban water supply became available for Manila the death rate from intestinal diseases has decreased, as represented by 3,558, the average of five years preceding 1908, and 1,195 occurring in 1911, not including typhoid or cholera, which are subject to special conditions.

The extension of medical and surgical relief and the establishment of modern hospitals among the wild tribes has had an inestimable influence in bringing them to the ways of civilization. Hosts of friends have been gained by the successful use of salvarsan for the treatment of yaws.

The custom of transferring the seat of government from Manila to Baguio from February to June is now firmly established. At this place indulgence in outdoor sports is encouraged, and lectures on popular health subjects are given.

As a result of the active campaign against mosquitoes, the city of Manila has been practically rid of those kinds that are troublesome to man. The following larvacide has been used with great success:

Crude phenol, containing 15 per cent phenols, s. g. 0.965	gallons	150
Rosin	pounds	200
Caustic soda	do	30
Water	gallons	6

This mixture is claimed to be an efficient disinfectant in dilutions of 1:500 and is an efficient larvacide in dilutions of 1:1,000.

A special investigation of health conditions in the Bataneo Islands was made. The stools of 400 persons showed 66 per cent containing *Ascaris lumbricoides*, 26 per cent hookworms, and all were afflicted with at least one form of parasite. The fever of the island of Itbayat was studied and found to be malarial.

The death rate among Americans in Manila has increased from 5.59 per thousand in 1907 to 16.53 per thousand for 1912. There are no data available to account for this steady increase.

Poisonous snakes are present, in spite of the popular impression to the contrary, and cause many deaths, the cobras being responsible for the majority. The following treatment is advocated:

1. Immediate free incision of the wound.
2. Effective ligature of the bitten member central to the wound.
3. Cauterization, preferably by the rubbing in of potassium permanganate.

Liquors and cardiac stimulants should never be used.

Bacillary dysentery has appeared from time to time. The "hill diarrhea" of Baguio was found to be of this type, and conditions favoring it were the excessive number of flies, accumulation of horse manure, improper disposal of garbage, and small capacity of the septic tank, as a result of which the water sometimes flowed through

it in four hours instead of the necessary 36 hours. It was found that many of the servants had been in the habit of washing the dishes in the overflow from these tanks. The dysentery decreased in direct proportion as the insanitary conditions were removed.

Treatment of leprosy with chaulmoogra oil has greatly benefited many cases, and in some has produced apparent cures.

Plague reappeared on June 19, 1912, and again on June 26; no infected rats were found, and it was considered that infected fleas had been introduced by sick rats in cargoes from infected ports.

No deaths from smallpox have occurred in Manila since 1909, showing the effect of general vaccination when contrasted with the thousands of deaths that took place annually before vaccination. The deaths in other Provinces occurred almost invariably in children born since the last systematic vaccination of the Province.

There were no deaths from beriberi in public institutions in which unpolished rice was used continuously; in these institutions there were formerly from this cause 600 deaths per year. Experiments at the Culion colony showed that the disease could be controlled by the use of unpolished rice and fruits. Infantile beriberi has been treated with extract of rice polishings, and among 15 infants so treated there were no deaths. The usual death rate is 50 per cent.

Yaws has been treated by the use of salvarsan; and the results have been satisfactory, many being cured.—(L. W. JOHNSON, PASSED ASSISTANT SURGEON, U. S. NAVY.)

REPORTS AND LETTERS.

REPORT OF CASES OF LEAD POISONING.[1]

By L. C. WHITESIDE, Passed Assistant Surgeon, U. S. Navy.

During the month of February, 1913, there were 8 cases of lead poisoning admitted to this hospital from ships then at the navy yard undergoing repairs. All but 1 of the cases were chronic lead poisoning, the other being acute. Seven of these cases were from the U. S. S. *California* and 1 from the U. S. S. *Maryland*. One case was sent to the hospital with a diagnosis of gastritis chronic catarrhal, another one with neurosis intestinal. These, however, under observation proved to be true cases of chronic lead poisoning. The cases from the U. S. S. *California* were admitted within a few days of each other. All of the cases admitted to the hospital belonged to the engineer's force of the ship.

The cases occurred while the ships were in dry dock undergoing repairs. The U. S. S. *California* went into dry dock on January 25, 1913, the first case appearing on February 5, 1913. The U. S. S. *Maryland* was docked on February 18, 1913, the lead case being sent to the hospital on February 21, 1913.

The mode of absorption in every case was through chipping red lead and working with paint in the bunkers and double bottoms. Statements by the medical officers of these ships as to the probable mode of absorption of the lead concurred in the opinion that it was due to the men having their bodies, hands, and faces covered with dust and chippings from the paint work, as well as fresh paint or red lead on hands and not removing it while eating noonday and evening meals. This carelessness on the part of the men is explained by the lack of water, the ship being in dry dock, and the distance of the wash houses from the dock. The lack of ventilation in the spaces occupied is considered an important factor, as on the U. S. S. *Maryland* the portable blowers were used for the ventilation of the spaces used. The medical officers stated that there were a great many more cases of chronic lead poisoning on board the ships, but that only those of the severe form were sent to the hospital.

[1] Abstracted from an official report to the Bureau of Medicine and Surgery, from U. S. Naval Hospital, Mare Island, Cal.

The symptoms in all the chronic cases were: Colicky pains in abdomen, chronic constipation, loss of appetite and blue lines on the gums at margins of incisor teeth. There was no actual wrist drop in any of the cases, although there was marked weakness of the extensor muscles of the forearm. In all of the cases there was a marked punctate basophilia present. The acute case presented all the above symptoms, and in addition there was marked irritability of the stomach, nausea and vomiting, lasting about one week. The cases all ran temperatures ranging about 100° F., going gradually to normal in about seven days.

The differential diagnosis of these cases of lead poisoning from appendicitis and pericolitis is considered important on account of the similar symptoms, i. e., generalized pain in abdomen, tenderness on pressure, temperature, and as in the acute cases, nausea and vomiting. The laboratory findings would materially assist in making the diagnosis.

Four of the cases that responded well to treatment were fit for duty in about five weeks, the remainder in about seven weeks. The men were sent to duty upon the disappearance of the blue lines on the gums, this being the last sign to disappear.

Treatment of the cases was in general: Rest in bed, 1 glass of milk t. i. d., magnesium sulphate 1 ounce given every morning. Symptoms were treated as they arose. Cases were allowed up in about 10 days, on the disappearance of the abdominal and more marked symptoms. Diet was gradually increased as recovery progressed. The acute case was treated by hypodermics of morphine sulphate and gastric sedatives. High enemas containing warm soapsuds 1 quart, molasses 1 pint, magnesium sulphate 1½ ounces, were employed when gastric irritability did not permit of the administration of the magnesium sulphate. Potassium iodide was given in 20-grain doses t. i. d., about the third week of treatment, after the symptoms of poisoning had disappeared and when the punctate basophilia was less marked. Fresh air and out of door exercise were carried out. In several of the cases showing slight anemia, Donovan's solution, minims five t. i. d., was prescribed.

It is thought that these, as well as other cases, might have been prevented had there been sufficient ventilation in the compartments occupied by the men at work. Close proximity of suitable wash rooms and careful oversight by responsible petty or chief petty officers would probably have corrected the carelessness as to personal cleanliness of the men so exposed. Dangers of lead absorption could be well made known to the entire crew or inculcated in the instructions on first aid as given on board ship. The use of gloves while at work of this kind would materially assist in preventing absorption of the lead. The

practicability of having respirators or even neckerchiefs over nose and mouth while at work to prevent or limit mode of absorption by inhalation should be considered.

TWO CASES OF CEREBROSPINAL FEVER.[1]

By P. S. Rossiter, surgeon, United States Navy.

Case I. J. C. S., P. M., transferred to this ship (*California*) from the marine barracks, Mare Island, Cal., March 12, 1913. Admitted to sick list with typical, mild case of measles, March 31, 1913. Temperature normal April 2, rash disappearing April 3. April 4 and 5 temperature 99.6–99° F., and normal thereafter until April 7, when he had a severe chill at 1 p. m., followed by temperature of 105.4° F., severe headache, projectile vomiting and extreme restlessness, photophobia and nystagmus, rapidly becoming delirious. Kernig's sign absent. Given calomel, sponge bath, ice bags to head and spine.

April 8, temperature 101.4° F., a. m., rising to 104° F., axillary. Through lumbar puncture 100 c. c. of cloudy spinal fluid was withdrawn and as no antimeningococcic serum was obtainable 100 c. c. of saline solution was injected and withdrawn and an equal amount again injected and again withdrawn. The temperature fell to 101° F., accompanied by lessened restlessness. The spinal fluid proved negative for the *Diplococcus intracellularis meningitidis*.

April 9, temperature 101–103° F., 40 c. c. purulent spinal fluid withdrawn followed as before by injection and withdrawal of saline solution. This fluid also proved negative for the *Diplococcus intracellularis meningitidis*.

His condition remained unchanged until April 13, when lumbar puncture was again made and 25 c. c. of purulent fluid withdrawn. This specimen yielded a few typical intracellular diplococci.

His temperature rose to 104° F. on April 13, fell to 99.2–101° F. on April 14, and again rose to 104° F. on April 15. He had not at any time regained consciousness. On April 15 a supply of antimeningitis serum was received and by lumbar puncture 25 c. c. of purulent spinal fluid was withdrawn and 30 c. c. of serum injected. The withdrawn fluid yielded only a few meningococci.

April 16. Condition markedly improved, temperature 99–101.4° F., conscious at times. Lumbar puncture failed to yield any fluid, but 15 c. c. of serum was readily injected.

April 17. Temperature 98.6–100.2° F. Completely conscious.

[1] Abstracted from an official report to the Bureau of Medicine and Surgery.

April 20. Temperature rose to 102.2° F. Lumbar puncture yielded no fluid, but 15 c. c. of serum was readily injected.

His temperature went to normal April 22, with only occasional rises to 99.4° F., and he has made an uneventful recovery with complete restoration of all functions.

Case II. C. E. M., F. 2d cl. Had been aboard this ship since December 30, 1910. Admitted to sick list with typical, moderately severe case of measles April 1, 1913. On April 3 he developed tonsillitis and some cough. The disease ran an uneventful course until April 9, when at 1.30 p. m. he had a slight chill and his temperature rose to 105.4° F., accompanied by photophobia, violent headache and projectile vomiting. Kernig's sign present. Lost consciousness at 4 p. m. Ice bags to head and spine, nostrils sprayed with formin (hexamethylenamine) solution and formin by mouth. His movements were so violent and exhausting that at 5 p. m. he was given morphine sulphate 15 mgs. hypodermatically and at 9.30 p. m. he began to show signs of respiratory embarrassment which rapidly increased in severity, causing death by respiratory failure at 4.30 a. m., April 10. Post-mortem spinal puncture yielded cloudy spinal fluid containing a few meningococci.

REMARKS.—Both of these cases probably acquired infection in San Diego, Cal., from which port the ship sailed April 3, and where several cases of cerebrospinal fever had recently occurred, one on board the *Maryland*. Still, it must be considered that these men had been segregated in a casemate on adjoining cots from April 1 to 7, and Case II may have contracted the disease from Case I, although both were receiving nasal douches of Dobell's solution during that time; and of six other men segregated in the same casemate during that time, none have as yet (May 20, 1913) developed the disease.

It is believed that "washing" the spinal canal with saline solution was of distinct benefit in Case I.

Upon the appearance of the second case it was represented to the commander in chief that it was urgently necessary to procure antimeningococcic serum with the greatest possible dispatch in order to save the lives of the men infected and to prevent great loss of life should other cases follow, and upon his representation a torpedo-boat destroyer was dispatched from San Diego for this port (Guaymas, Mexico) as soon as the serum could be obtained from Los Angeles.

A marked improvement following the injection of the serum is to be noted.

A 20 per cent solution of argyrol was used throughout the disease to spray the nostrils and throat of Case I and is still continued once daily. Formin was given in 500 mgs. doses t. i. d.

LEAD POISONING.

Abstract from a special report made by the American Museum of Safety for the Navy Department.

Lead as a metal and in its compounds is a dangerous poison. Wherever workmen come in contact with it, poisoning may set in sooner or later.

Lead poisoning is the result, usually, of minute particles of lead entering the body in eating, drinking, smoking, snuffing, and chewing tobacco while at work and with soiled hands, or as dust inhaled during the working period.

The absorption of lead in this manner may not show immediate consequences. Weeks, months, and years may elapse before a sufficient quantity of lead has been taken into the body to bring about the symptoms of lead poisoning.

Sensitive persons, according to Brouardel, have been made ill through a daily absorption of only 1 milligram of lead, while other persons show a remarkable degree of resistance.

The first symptoms of lead poisoning are bodily weakness, loss of appetite, a paleness of the lips and face, indicating a lack of blood, and a blue-gray discoloration of the gums. Most frequently lead colic makes its appearance. The diseased person suffers violent cramps and distress in the abdominal region, the stomach is drawn intensely, and vomiting is of frequent occurrence. Rarely is there diarrhea, but chronic constipation is more frequently the rule. The nerves and muscles controlling the movements of the fingers become paralyzed; in exceptional cases, other muscles of the arms, legs, and shoulders may be affected. Sometimes lead poisoning makes its appearance with violent pains resembling rheumatic pains in the joints of the lower—rarely the upper—extremities.

It is the opinion of Dr. Thomas M. Legge, His Majesty's medical inspector of factories of Great Britain, that the presence of the Burtonian or blue line on the gums is, as a rule, indicative of lead absorption and not of lead poisoning. As a danger signal its value is immense and hardly less so its value in diagnosis in doubtful cases. Whenever the line is seen risk is imminent and poisoning among the workers is inevitable in the absence of adoption of precautions. Unfortunately, careful dental toilet, which the surgeon will necessarily lay stress on, may prevent development or the practice, when adopted, cause disappearance of the line after the lapse of a few months. Under these circumstances the merest trace will have all the significance of the fully developed line in a worker neglectful of care of the teeth. Among new workers a commencing blue line should be strong evidence of the need for dust removal at some point in the

process of manufacture. The blue line is more dense in occupations giving rise to fumes or to dust of compounds of lead than in those necessitating the handling of metallic lead or its alloys, as in the work of compositors, tea-lead rollers, solderers, and the like.

Lead poisoning may result in loss of the senses of smell and taste, in blindness, in morbid changes of the heart and blood vessels, in the disease of the kidneys known as "shrunken kidney" and in mental disturbances. In the case of women diseased by lead miscarriages and stillbirths are of frequent occurrence. Children of such parents are subject to a higher mortality and if nursed at the breast are poisoned by their mothers' milk.

With the exception of the most serious cases and those in which the brain is affected lead poisoning is curable if the diseased person can get away from the toxic conditions. Restoration to health comes slowly. In some cases months may elapse before a cure is effected.

A most interesting contribution to knowledge of industrial poisons was made in the report of the commission on occupational diseases to the legislature of the State of Illinois in January, 1911. The poisons studied by the commission, composed of physicians, surgeons, and factory inspectors, were lead, arsenic, brass, zinc, turpentine, carbon monoxide, potassic cyanide, silver nitrate, hydrofluoric acid, and the chromates.

As a result of their investigation into the lead industries of Illinois the commission reported that the compounds of lead are dangerous in the following order, depending upon their solubility in the human body.

1. Sugar of lead, which is used in dry-color works, in the making of sanitary supplies and in colors for textiles, etc. Although this is the most soluble it is really not as dangerous as white lead, because its decidedly disagreeable taste prevents it from being swallowed in any quantity.

2. White lead, in white lead factories, dry-color and paint works, and wherever paint is used; also in some pottery glazes and enamels, in the coloring of wall-papers and textiles, etc. It is almost as soluble as sugar of lead and has a faintly sweetish taste.

3. Lead oxide and suboxide, which comprise the fumes and the skimmings wherever lead is melted. It is nearly as poisonous as white lead, especially as the fumes from melted lead are very finely powdered and thus easily breathed in. Some authorities consider it more dangerous than white lead.

4. Red lead and litharge, which are found in red-lead factories, in storage-battery works, in dry-color and paint houses, in the glaze of potteries, enameled signs and sanitary supplies, and in the making of rubber.

5. Chrome yellow and green, which are used in dry-color and paint houses, for paintings, for dyeing textiles, artificial flowers and wallpapers. These are about as poisonous as red lead.

6. Metallic lead and the other salts of lead are less dangerous because so much less soluble, but in the case of metallic lead a fine coat of oxide is continually forming on the surface and this is easily blown off or comes off on the fingers so that lead poisoning occurs occasionally even in places where the

lead is not melted but only handled in solid form. It is, however, more frequent when the lead is present in molten form. There is a general impression that melted lead is not dangerous at a low temperature because it does not volatilize under 100° C. The danger from melted lead is not only, however, that the lead may be volatilized, but that the film of oxide which is continually forming on the surface of the liquid lead blows off whenever the liquid is disturbed.

According to the findings of the commission, the American worker in any of the lead industries is not only more exposed to danger than in either England or Germany, but he is not as carefully protected by hygiene regulations.

A point emphasized in the report is the indifference of the management with regard to the instruction of new workers not familiar with the dangers of the trade. Newly arrived foreigners, for example, will be put to work without instruction either as to the avoidance of danger in the plant or the proper care of themselves to mitigate the danger.

This results in the dropping out of the worker who becomes ill himself or who sees a fellow worker suffering from the effects of the poison. In consequence of a very general indifference to the welfare of employees, the dangerous lead trades are in bad repute with the working class in America and there is a continual moving in and out of unskilled workers. Such a condition is naturally more productive of poisoning than would occur among a permanent force of workers where knowledge of the dangers of the work and experience in self-protection would develop a degree of immunity.

Some of the most rapidly developing and severest cases of lead poisoning have come from storage-battery plants. Yet it is possible to render such places quite safe and healthful.

Under date of May 11, 1898, and again of May 6, 1908, the chancellor of the German Empire issued regulations for the prevention of lead poisoning in accumulator works.

In brief, these regulations require: That the floors of such workshops shall be impermeable; that exhaust systems should be provided for carrying off the fumes from the melting pots as well as the dust arising in the making of grids and frames from lead plates, in mixing and grinding oxides and in pasting; that all processes giving rise to lead fumes and dust be carried on in separate rooms; that the paster's table be cleaned thoroughly every day; that records be kept of the physical condition of the workers; and that they be instructed in matters of personal cleanliness and safe methods of performing their work. In addition, the regulations require that the sulphuric acid used in accumulator works be clean and free from arsenic, the presence of which would increase the danger of poisoning.

In Great Britain the requirements with regard to storage-battery works are analogous to those in Germany. That it is possible to

render such places comparatively safe and healthful is shown by the records of large English factories.

At the Hart Accumulator Works in London 80 to 100 men are employed and there has been no case of lead poisoning for over a year. On the other hand, one small plant in Chicago, belonging to one of the railroads, employs only 15 men, but had 2 known cases of lead poisoning in a period of nine months.

In the manufacture of white lead, the old "Dutch" process, which was introduced into England about the year 1780, is considered the best method of converting metallic lead into lead carbonate. The process consists in casting metallic lead into thin plates, placing them in earthen pots with weak acetic acid and burying the pots in stacks filled with fermenting tanbark, where the change from metallic lead to the white carbonate takes place. The processes through which the white lead has to pass, from its formation in the tanbark stack to the final product, involve a good many dangers to the workmen, depending largely upon whether machinery or hand labor is used and whether there is a high standard of cleanliness in the factory.

First the corroded lead, with a small amount of uncorroded metallic lead, must be taken out from the tanbark stack and the uncorroded part must be separated from the corroded. The white lead is then ground in water, strained and bolted, and all the time small particles of unchanged lead are being removed and carried off, either to be melted again or to be corroded again. As soon as the white lead is in water there is no danger to the workman unless the tanks leak badly and the floor is allowed to dry and get dusty. In the emptying of the stack and in handling the unchanged lead, which has a good deal of white lead sticking to it, there is always more or less dust.

The ground white lead and water are pumped into large drying pans, and when all the water has been driven out these pans must be emptied by shoveling the white lead into some receptacle, sometimes a closed hopper, more often an open truck. Some of the dry white lead is ground in oil and this is a dusty process or not, according to the care with which it is done. Besides the lead ground in oil and the dry white lead, some factories also make what is called "pulp lead," which is by far the safest product as far as the health of the workmen is concerned. No drying is needed for pulp lead. The water is driven out by grinding with oil.

In the United States the methods of manufacturing white lead by the old Dutch process make the work more dangerous than in England and in Germany, for it is impossible to control the dust as completely when dry separation is used as when the separation takes place under water. Dry separation involves emptying the stacks

without sprinkling, the discharge of dry returns from the separator, and the installing of a dust-collecting system. The American method of drying ground white lead in open pans and emptying these by hand produces more dust than the English and German methods.

In one English white-lead factory employing 182 men careful medical inspection failed to discover one case of lead poisoning in the year 1909–10. In an Illinois factory employing 142 men, partial inspection revealed 25 men suffering from lead poisoning. In another English factory employing 90 men, no case was discovered for five successive years. In an Illinois factory employing 94 men, 28 per cent of all the employees had had lead poisoning and 40 per cent of all those employed in the dustier work.

A complete system for the safe handling of white lead from the drying pans until it leaves the chaser as lead-in-oil paste, has been perfected and is now in operation by the National Lead Co. From a sanitary standpoint this is the most notable improvement made in lead manufacture in America since the early days when inclosed machinery was substituted for hand labor in separating the white lead from the scraps of metallic lead which had failed to corrode.

The danger to the workman in a white-lead factory comes from the breathing of dust, from handling food or chewing tobacco with lead-smeared hands, and from getting his hair, clothing, and body covered with white-lead dust so that he carries it home with him.

The precautions to be observed consist in prevention of dust as far as possible and in providing for and insisting on personal cleanliness.

The dusty and therefore dangerous processes are: (1) Filling the melting pot with dry cores, which are covered with white-lead dust; (2) stripping the white beds; (3) trucking and dumping corrosions or any form of dry white lead; (4) emptying drying pans; (5) filling chasers by hand; (6) filling barrels or small kegs; (7) heading up barrels.

LEAD POISONING AMONG PAINTERS.

The painting trade is perhaps the most important of the lead industries, because of the number of persons employed in it.

All lead paint such as white lead, lead chromate, massicot, red lead, superoxyd of lead, Pattison's white lead, Cassler yellow, English yellow, maple yellow, and other compounds are poisonous. Painters, calciminers, whitewashers, lacquerers, and others coming in contact with these substances are constantly exposed to the danger of lead poisoning.

In Great Britain, as in other countries, the painters, with the white-lead workers, head the list of victims of lead poisoning. According to the report of His Majesty's chief inspector of factories and workshops in Great Britain for 1909, in the course of 10 years 1,973 cases

of poisoning were recorded among painters and plumbers, with 383 deaths.

The following statistics, furnished by Dr. Rambousek, of Prague, will give some idea of the frequency of lead poisoning among painters, varnishers, and lacquerers in Germany and Austria.

In 1896 the local sick fund for painters and varnishers in Berlin reported, among 100 cases of illness, 27 cases of lead poisoning—more than one-fourth of the total. According to the statistics of the central sick and burial fund for painters and workers in allied trades in Germany there were, in 1902, out of 7,245 members, 169 ill with lead poisoning, and in 1903, out of 7,365 members, 177 ill from the same cause.

The local sick fund of the city of Frankfort on the Main recorded, in 1903, for each 100 painters, lacquerers, and workers in similar trades, 11.6 cases of lead poisoning.

The local sick fund for painters and varnishers in Berlin has for a number of years kept records of the number of cases of lead poisoning among its members. For the years 1907–1910, with an average membership of 4,975, the deaths were as follows:

Year.	Total deaths.	As the result of lead poisoning.	Per cent of total.
1907	69	13	19
1908	57	10	19
1909	51	11	22
1910	57	9	17

These statistics show an average of 18 per cent of the deaths to be due to lead poisoning—a very large proportion.

Because they so frequently work in damp and drafty buildings painters are very susceptible to tuberculosis. During the winter months sometimes as high as 75 per cent of the painters are unemployed. One result of the period of unemployment is insufficient nourishment for the worker and his family, a favorable condition for the development of this dread disease.

With an average membership of 3,684 during the years 1900–1910 the sick benefit fund of the painters of Berlin records 5,550 cases of lung diseases, including tuberculosis and influenza, which cost 332,346 marks for 181,597 days of sickness.

Out of the 54 cases of lead poisoning treated in 1902 in the hospitals of Munich 33 were painters and lacquerers.

The statistics in the last few years show a decrease in lead poisoning among the painters in Germany—a decrease undoubtedly due to the regulations that have been enacted with regard to protective measures.

In the reports of the imperial royal office of labor statistics of Austria the distribution of the number of workers and the cases of lead poisoning have been computed according to the months of the year. It is interesting to note from this computation that the number of workers employed in painting, varnishing, and similar trades is greatest in the months of August and September, while the number of cases of lead poisoning culminate in the months of October and November.

Among the industries involving painting, varnishing, and lacquering work in which the danger of lead poisoning is present are ironworks and machine work (using minium in large quantities and also white lead); tinware and iron furniture factories (using minium, white lead, chrome green, chrome yellow, zinc white); carriage factories (white lead, minium, chromate lead colors); railway workshops and wagon factories (white lead, minium, chromate colors); factories for agricultural implements (white lead, zinc white, lithopene, minium, cinnabar, and a few chromate colors); wood furniture factories (white lead, chromate lead colors); ship building yards (much minium and also white lead).

In the investigations of the Austrian bureau of labor statistics it was found in ironworks and machine shops that out of 18 color mixers and painters examined 7 were afflicted with the "blue line"; moreover, there were found in all the industries mentioned persons who had at some time suffered with lead poisoning. In one establishment at Gratz an average of one to two cases of lead poisoning have been observed in recent years. In the tinware and iron furniture industries out of nine lacquerers examined four showed the "blue line." In a Vienna iron furniture factory one laborer had lead poisoning and lead diseases had occurred there every year. For carriage factories very few data were to be found to show the existence of lead poisoning. For wagon and kindred factories out of 76 injured workers only one was affected by lead. In Austrian shipbuilding yards lead poisoning is apparently of rare occurrence, in 1905 only three cases having occurred in the Trieste shipbuilding yards.

The following communication received from an experienced American painter bears evidence, from the worker's point of view, of the dangerous conditions encountered by men employed as painters in the shipyards of the United States:

As an employee of the Philadelphia Navy Yard, at Philadelphia, having had over 10 years' experience in shipyards as a painter, I wish to state my own experience, along with what came directly under my notice.

My first position as a ship painter was in Cramps' shipyard, at Philadelphia, Pa., where I was put to work on the new battleship *Maine*, in the barbettes of the turrets, where I was overcome with the fumes of the paint. First, I com-

menced to perspire; then my nose and my eyes commenced to water, so that I could hardly see; after this I imagined I heard sleighbells and the most beautiful music; then I remembered no more until I found myself floored on the main deck, and they told me I had been knocked out by the fumes.

Again, on the U. S. S. *Yankee*, another man and I were overcome with the fumes of turpentine while working forward in the paint locker.

I experienced the same thing in the engine-room of the U. S. S. *Montgomery*. After about 18 months of this work I was working in the old dry dock at the same yard when all at once I dropped and could not get up for some time. When I did I went straight to my doctor, and he laughed at me, saying, "You're all right; there is nothing the matter with you," but he gave me a prescription. On my way to the drug store I fell on the pavement. I was taken home and confined to my bed for five days; in fact I was not able to raise my head. The doctor then stated I was "leaded."

After my recovery I was put in charge of a gang of men as leading painter. I have had from 1 to 18 men lying on the deck at one time overcome with fumes, out of a gang of 50 men. Many of them went home and never returned. It is a common occurrence to hear that "so and so," meaning a painter, is dead. The average life of a ship painter is from 25 to 35 years of age. I know this to be a fact, because I have been in charge of men at this kind of work for the past six years.

I am told that France and Germany have done away with lead in their paint composition, but it is not alone the lead that kills, but the fumes from the various liquids used in mixing paints. The only place where lead is dangerous is in its manufacture and scalding it off in the dry form.

I find now this great improvement in doing away with lead only brings a material on the market which is far worse to apply in confined places, for instance, rabok paint, the fumes of which are so bad that a man can not work over five minutes, at the longest, in a close place. When properly applied it is far superior to red lead, but a man can not apply it properly, because he can not stand it.

Another paint is bitumistic paint, which throws a dense smoke while being applied, and burns the skin from the men's hands and faces.

I will further say that I stand ready to go aboard any battleship or large steamer and prove that there is not one afloat with her inner compartments properly scaled and painted up to date, be it new or old, because it is impossible for the men to stand the fumes and dust under present conditions.

The burning off of old paint gives rise to fumes which are a fruitful source of danger. The fumes from new paint prove harmful to many people. Sir Thomas Oliver cites an outbreak of colic on board a newly painted French man-of-war as due to this cause. The same authority has pointed out that the use of quickly drying, or spirit, paints in ship painting is dangerous not so much on account of the lead contained in the paints as the spirit, which is inflammable and has an intoxicating effect upon the workers using such paint in closely confined and badly ventilated places.

An experiment by Prof. Trillat, of the Pasteur Institute, Paris, demonstrated that it is not the turpentine that causes the symptoms experienced by some people who are made ill by inhaling the fumes of fresh paint. When the paint was made of zinc white instead of

WRIST PARALYSIS.

(Budapest Museum of Safety.)

SHOWING HOW PAINTER MAY EASILY ACQUIRE LEAD POISONING BY EATING WITH UNWASHED HANDS AND IN THE DUSTY ATMOSPHERE OF THE SHOP.

(Budapest Museum of Safety.)

white lead, although it contained the same amount of turpentine, the symptoms were not present.

The rubbing or smoothing of painted surfaces with pumice stone or sandpaper before applying a fresh coat of paint is perhaps the most dangerous feature of a painter's work, as the process raises clouds of white-lead dust, which the worker inhales. In interior painting on houses, cars, carriages, automobiles, and ships the work is particularly dangerous.

According to the reports of the factory inspectors of Great Britain cases of lead poisoning in shipbuilding are due not so much to mixing the paints or red-lead paste as to the dust produced in sandpapering the coats of white paint applied in cabins, in chipping and scraping off old red lead paint, often in confined spaces, such as double bottoms, tanks, and bilges, splashing from injecting red lead between plates, fumes from burning off old paint, and fumes from paint while using it in confined spaces.

PERSONAL CLEANLINESS.

As a rule, painters are very careless and needlessly expose themselves to danger. The special causes of poisoning in the painting trade are entry of particles of paint into the body through carelessness in handling paints and brushes, neglect to wash the hands before eating, and the inhalation of lead dust.

Lead poisoning can frequently be traced to the practice of holding the paint brush between the teeth and to holding and working white-lead putty in the hands.

The most effective measures against lead poisoning in the painting trade, as in the other trades in which lead is encountered, are personal care and cleanliness and the elimination of dust and fumes by adequate systems of exhaust and ventilation.

Complementing the mechanical sanitary improvements at the factories of the National Lead Co. are the provisions made for personal hygiene, such as the installation of complete washing and bathing facilities, with hot and cold water, a free supply of towels and soap, and an allowance of company time twice daily for washing; the installation of double sets of lockers, one set for working and the other for street clothes. Every possible effort is made on the part of superintendents and foremen to influence employees to make effective use of the facilities provided.

Dr. F. Blum, who has given a soap recommended for painters and other workers in lead, called "Akremnine," careful analysis, writes in the Vienna Weekly Medical Review:

In an experiment, I caused men employed in an accumulator factory, immediately after they had scrupulously performed their usual washing, to dip their

hands into a solution of sulphuretted hydrogen. Their hands became quite dark, showing conclusively that lead still adhered to them. In order to safeguard permanently against the dangers of lead poisoning it is of paramount importance to neutralize the effect of the lead. "Akremnine soap" appears to me to fully meet this necessity, producing when used in washing sulphuretted hydrogen; therefore, not only excluding the formation of lead soap, but also transforming all the remaining lead to the relatively innocuous form of sulphide of lead and rendering possible a simultaneous cleaning of the skin with soap. The lead can be removed by the use of warm water and a thorough cleansing with a brush; at the same time the skin will lose the smell of sulphuretted hydrogen.

Dr. Robertson, chemist of the Royal Gunpowder Factory at Waltham Abbey (England) has obtained good results, without the discoloration caused by "Akremnine," from the following preparation:

Sal ammoniac added to saturation to a solution containing 8.5 c. c. of hydrochloric acid (specific gravity, 1.15) per 100 c. c. of water.

At Waltham Abbey the workmen must first cleanse their hands with soap, water, and a nail brush; next they dip a nail brush in the special solution and thoroughly scrub their hands with it; following this, the hands are rinsed with clear water and then washed with soap and water.

Sand soap is used in many German factories where there is danger of lead poisoning. Dr. Sommerfeld has found in his experience that pumice soap and turpentine are the best cleansers lead workers can use.

SUITABLE CLOTHING.

In special rules and regulations in various countries stress has been laid on the wearing of overalls and head coverings in processes giving rise to dust or to splashes of glaze or paint. Of course, with improvements in exhaust ventilation, they become less important.

Direct contact with lead substances should be avoided as far as possible. If, however, it is necessary for the workman to handle such materials, moisten or dust his hands with them, gloves should be worn.

RESPIRATORS.

Direct protection for the nasal passages is also necessary. For this purpose specially designed respiratory apparatus should be worn. Sometimes simply sponges or rags tied in front of the mouth or nose are sufficient. Generally, however, conditions require more complicated devices. Some of these surround only the nose and mouth; others, the entire face, like a mask; and there are still other types, as a helmet, which takes in the entire head. These devices are all fitted closely by means of india-rubber mounts, and possess a breathing aperture closed, generally, by two parallel grids of wire gauze,

between which is a layer of cotton wool, through which respiration takes place. The cotton wool acts as a filter and retains all the dust. The outer grid either is removable or can be turned on a hinge so that the wool can be taken out and replaced by a fresh supply. Whether the mask surrounds only the mouth and nose of the wearer or the entire face and head, it should be constructed of material impermeable to air and provided with protected openings for the eyes when the type of protection renders it necessary.

It is the opinion of Drs. Legge and Goadby that—

If a respirator must be worn, the simplest form is a pad of ordinary nonabsorbent cotton wool (absorbent wool quickly becomes sodden and impervious), about 3 inches by 4 inches, placed over the mouth and nostrils, and kept in position by elastic bands pressed round the ears. The pad should be burned after use.

On the other hand, we find Dr. Rambousek authority for the statement:

When a worker must temporarily be in an atmosphere filled with poisonous dust, the wearing of respiratory apparatus, preferably covering the entire head, is recommended.

SUITABLE FOOD AND DRINK.

All of the authorities agree that workers in lead should never be allowed to commence their work fasting.

Suitable food is well-nigh essential for protection against lead poisoning. Well fed, strong workers are better able to resist the action of poisons; while badly fed workers, who generally suffer from digestive disturbances, are very sensitive to toxic influences.

It is highly important that some form of fluid should be supplied which the men may drink without harm. In some factories the use of some type of lemonade containing sodium citrate is recommended, as it has been shown that one of the pathological effects of lead absorption is to produce an increased viscosity of the blood, and the use of such drugs tends to some extent to diminish this. A drink containing a few grains of sodium citrate to the ounce and flavored with lemon is freely drunk by workmen engaged in the laborious processes.

MEDICAL EXAMINATION.

The value of frequent medical examinations of workers in lead industries has been amply demonstrated. Not only do the periodic inspections reveal the existence of symptoms of poisoning, leading to the prompt treatment of the victim, but they also determine weaknesses and tendencies that may be overcome by a change of work. An examination of all applicants for work in the occupations endangered by lead will weed out those who have already been poisoned

as well as others whose constitutional deficiencies show them to be unable to withstand the insidious effects of lead.

Employees in places where lead is handled should be medically examined not only when accepted for employment, but also at regular periods afterwards. In this way the physically unfit may be eliminated and receive prompt treatment.

Records should be kept of the workers exposed to the danger of lead poisoning, their state of health, and the result of the periodic medical examinations, and of the diseases, their duration, symptoms, treatment, and cure. In many countries where the keeping of such records is required by law it has been found of great advantage to the employers.

The health of the workers should be a matter of constant supervision by inspectors, foremen, or anybody able to recognize the first signs of lead poisoning, capable of rendering first-aid treatment and of supervising proper precautionary measures.

In the actual routine examination it may be useful to describe the procedure where a large number of workers pass before the surgeon in a white-lead works every week. The points noted are:

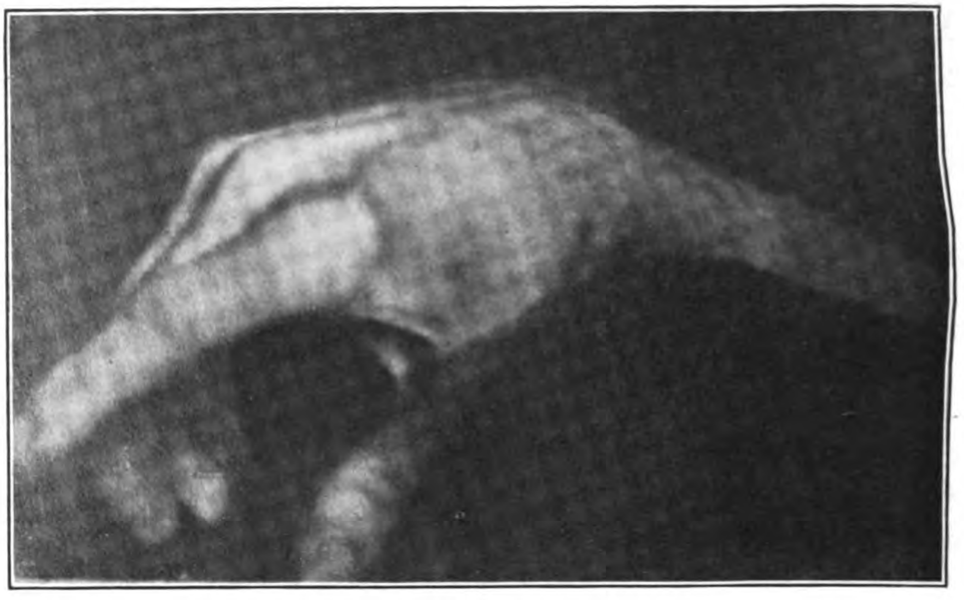
1. The general appearance of a man as he walks forward, especially the face with regard to anemia, which in the majority of cases of early lead absorption is not a true anemia, but is due to vasomotor spasm of the arterioles of the face and eyes. Frequently, on speaking to a leadworker the face, apparently anemic, flushes directly.

2. The brightness of the eyes, state of the pupils, and condition of the conjunctivæ and ocular muscles.

3. The mouth should next be examined, and search made for any evidence of "blue line" around the gum.

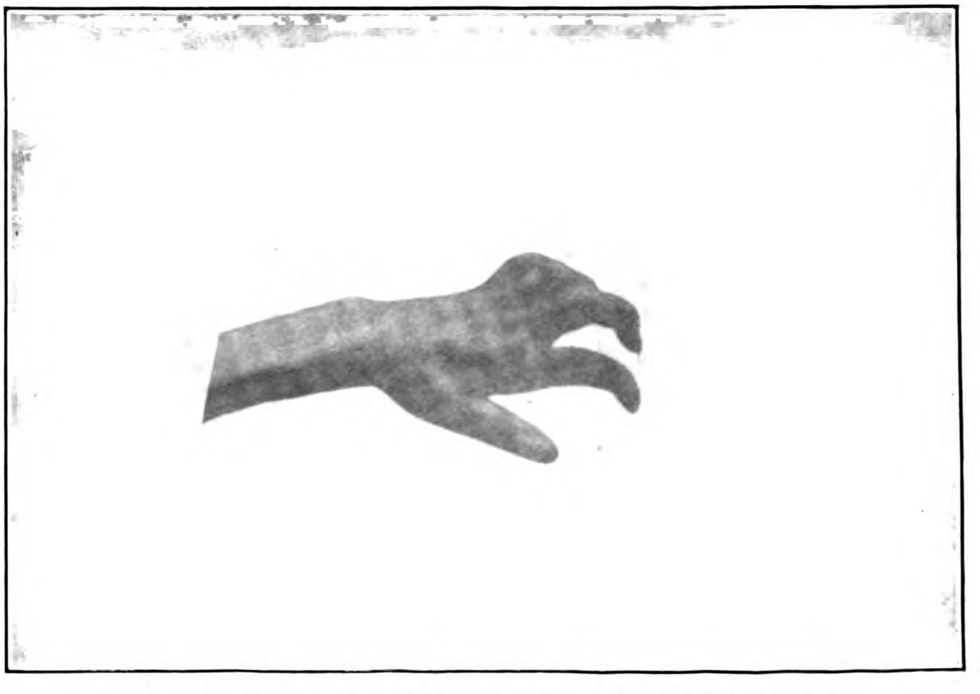
4. The gait should be watched, both on advancing to, and retiring from, the surgeon. If necessary, the man should be made to walk a few steps. Although the peroneal type of palsy is extremely rare, the possibility of its occurrence should never be absent from the mind of the surgeon.

5. The man should then be directed to stretch his hands out in front of him, with wrists extended and fingers widely spread. Presence or absence of tremor should be looked for, and the condition of the finger nails, as to the practice of biting, etc. The extensor power should then be tested, first of the fingers. While the hands of the workman remain outstretched, the physician places the forefinger of his hand in the outstretched palm of the workman, and the ball of the thumb upon the extreme tip of each finger, and by gently pulling it down, noting the spring present in the muscles. This test is probably the most delicate there is for detection of early extensor paralysis. The condition of the lumbricals and interossei is noted on move-

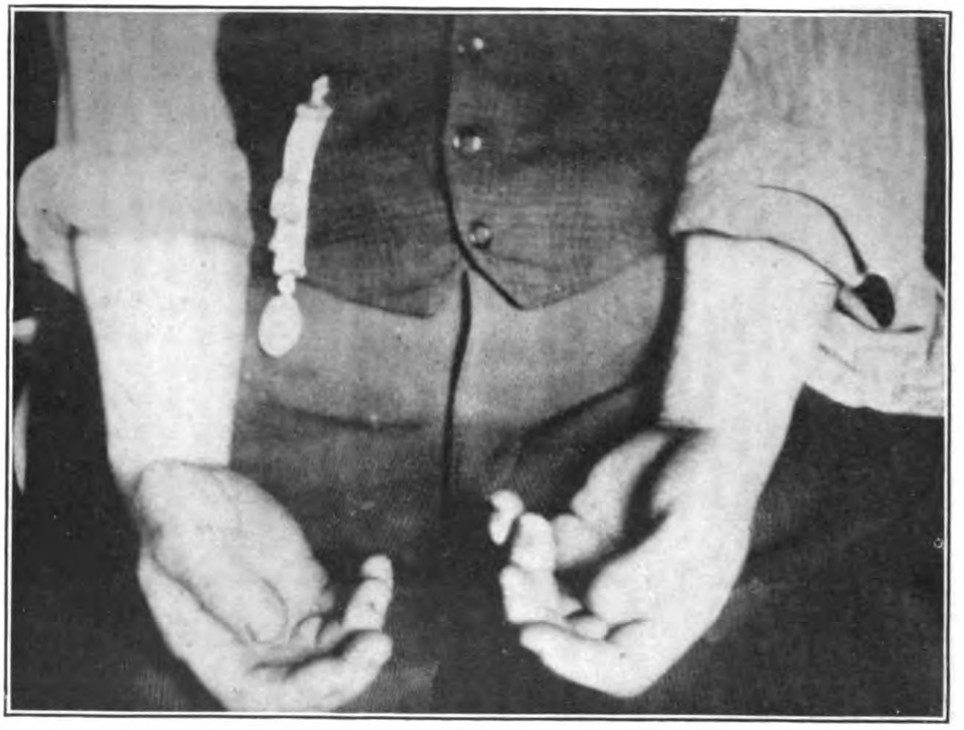


PARALYSIS OF HAND AND FINGERS.

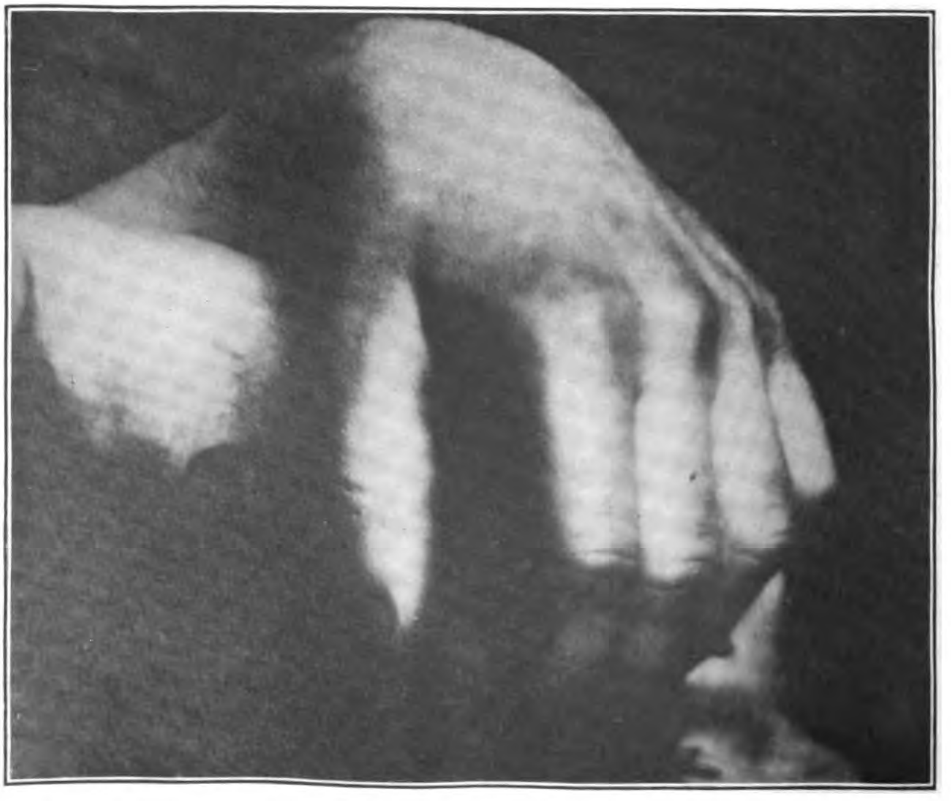
(Dr. Teleky, Vienna.)



PARALYSIS OF HAND AND FINGERS DUE TO LEAD POISONING.



WRIST DROP.



WRIST PARALYSIS.

(Dr. Teleky, Vienna.)

ment of the fingers. The extensors of the wrist are then further examined, the workman being directed to flex his arm at the elbow and strongly pronate the wrist, so that the palm of the hand is directed forward. He is then told to close the fist when the physician endeavors to flex the wrist, the workman at the same time resisting by forcible extension of his wrist. Ordinarily the extensor communis digitorum and minimi digti are sufficiently powerful to resist a very powerful pull upon the wrist; and if the wrist is found to yield, it is a sign that the muscles are affected. Sometimes the strength of the wrists and fingers is judged by the physician placing his palms on the dorsum of the patient's outstretched hands, and seeing whether the patient can be prevented from lifting them without flexing the wrists or finger joints.

The test detects (1) paralysis which has been recovered from to a a large extent; (2) commencing partial paralysis; and (3) weakness of muscular power, especially in those who have worked in lead for a number of years. This weakness appears to be an effect of lead upon the muscular tissue or dependent on debility, the result of lead absorption, and independent of nerve implication. The condition has sometimes remained unaltered for years, and again has been absent for months together.

6. The pulse is next noted. The pulse rate need not ordinarily be counted, but if it is either very slow or fast, careful examination at the conclusion of the general inspection should be made.

It is well to make all these points before asking any questions. After they are completed inquiry as to regularity of the bowels, existence of pains or discomfort, should follow. The speech should be noted, as slurring or hesitating speech is occasionally associated with early lead poisoning.

SPECIMEN INSTRUCTION LEAFLET GIVEN TO CERTAIN LEAD WORKERS IN GREAT BRITAIN.

As lead does not enter the system through the pores of the skin, it can in great measure be avoided by—

1. Taking special care to avoid raising dust. It is to the interest of everyone to see that ventilating arrangements are in order for carrying dust away at the point where it is produced.

Any little cloud constantly made at work is sure, if breathed, to set up lead poisoning. Where lead colors are used wet, danger arises from the splashing of the material and its subsequent drying into dust.

2. Paying scrupulous attention to cleanliness of the hands, face, teeth, and clothing. The hands and nails should always be cleaned with soap and nail brush before food is eaten, and it is a wise practice also to wash out the mouth. The teeth should be brushed at least once a day, preferably before the evening meal.

3. Never commencing work on an empty stomach. Food containing fat, such as bacon and milk, is suitable.

Overall suits, if worn, should never be shaken to rid them of dust. They require washing at least once a week.

Aperient medicine, such as Epsom salts (1 or 2 teaspoonfuls in water), can be taken once or twice a week with advantage by lead workers.

Experience shows that the habits and home life of the workers influence their liability to lead poisoning. Intemperate persons are the first to fall victims. Those who begin work on an empty stomach incur additional risk by doing so.

Carefulness while at work, and cleanliness, offer the best means of escaping attacks of lead poisoning.

Those who work in lead should keep in mind every hour of every working day the importance of not breathing lead dust and not carrying lead to the mouth in any way.

Medical advice should at once be obtained if signs of lead poisoning present themselves.

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